Reported by (Name):	**Russell Tarver.**
Organization:	**American Institute of Physics.**
Position Title:	**Advisory Committee Member; Statistical Research Center.**
Activity:	**Annual Meeting.**
Meeting Dates:	**March 1, 2013.**
Meeting Location:	**College Park Maryland.**
Payment $:	**None, but travel and hotel funded by AIP.**
Reasons for Attending or not Attending	**AAPM has a member position on the SRC advisory committee.**
Issues from Previous Meetings or Year:	**SRC had suffered the loss of a research position and felt that there was a definite negative impact on the SRC's ability to meet planned reports.**
General Description of Activities of the Organization and/or Meeting:	**Annual meeting of the various advisory committees and other committees.**
Issues for AAPM:	**None, though a substantial amount of the SRC's efforts go towards analysis of higher education facilities as well as the job market for traditional physics and engineering, and in general do not review and/or report on the field of Medical Physics. This was discussed during the meeting and after the meeting. William Hendee was consulted regarding any future needs of the AIP's SRC and he felt that the AAPM had a good handle on any necessary statistics via the CAMPEP process.**
Budget Request ($):	**None.**
Attachments	**1: SRC Advisory Committee report,** **2: Staff Response to report** **3: SRC report to Advisory Committee**

REPORT FROM THE ADVISORY COMMITTEE FOR THE STATISTICAL RESEARCH CENTER

March 1, 2013

Attending: Laura Kay (chair), Susan Humphris, Steven McCauley, Marie Plumb, Willie Rockward, Russ Tarver, Carlos Lopez-Mariscal

SRC Staff Present: Roman Czujko, Rachel Ivie, Patrick Mulvey, Raymond Chu, Susan White, Mark McFarling, Judith Mulvey, Arnell Garrett, Casey Tesfaye

Guests: Aaron Schuetz, Vashti Sawtelle, John Layman, Tim Cohn, Robert Hilborn, Jack Hehn, Richee-Lori Smith, Catherine Manduca, John Mather, Nicole Cranberg

General Comments:

The committee thinks that SRC continues to provide excellent service to the physics community and to the member societies. We are concerned that budgetary and SRC staff constraints have meant that not all recommendations from the previous year have been implemented. If AIP finances stabilize, given the first two recommendations below, and the number of outside contract studies, we suggest that consideration be given to reinstating a position to the SRC. The SRC gave up a research support position in the fall of 2011, and the senior staff have carefully analyzed changes in their work flow, concluding that filling a new position at the professional level would enhance the SRC's productivity and efficiency.

Recommendations:

1. SRC should emphasize its core studies that provide essential data and are strongly valued by the AIP community.

2. SRC should develop a research plan for a study of academic employment, including part-time and two-year faculty college, with special attention to the issue of the climate for underrepresented faculty.

3. SRC should study the persistence and attrition of physics undergraduates as described in the SRC 3-Year Implementation Plan.

4. SRC should discuss with AAPM the possibility of adding CAMPEP approved graduate Medical Physics departments to degree surveys.

Staff Response to the Recommendations from the SRC Advisory Committee
May 21, 2013

Attending: Laura Kay (chair), Susan Humphris, Steven McCauley, Marie Plumb, Willie Rockward, Russ Tarver, Carlos Lopez-Mariscal

SRC Staff Present: Roman Czujko, Rachel Ivie, Patrick Mulvey, Raymond Chu, Susan White, Mark McFarling, Judith Mulvey, Arnell Garrett, Casey Tesfaye

Guests: Aaron Schuetz, Vashti Sawtelle, John Layman, Tim Cohn, Robert Hilborn, Jack Hehn, Richee-Lori Smith, Catherine Manduca, John Mather, Nicole Cranberg

Recommendations:

1. *SRC should emphasize its core studies that provide essential data and are strongly valued by the AIP community.*

Each of the core surveys will be conducted as scheduled during 2013. There will no substantive changes to the questionnaire instruments or to the pool of people who have historically been surveyed by each of these surveys. The changes that will be considered all focus on methodological changes that are intended to improve efficiency.

2. *SRC should develop a research plan for a study of academic employment, including part-time and two-year college faculty, with special attention to the issue of the climate for underrepresented faculty.*

Since the SRC does not have a list of physics faculty members, we will begin this project by starting to compile such a list in the fall of 2013. We will use various strategies, such as Google searches and contacting chairs of departments, to develop lists. We will also begin formulating a questionnaire to address the climate for faculty members.

3. *SRC should study the persistence and attrition of physics undergraduates as described in the SRC 3-Year Implementation Plan.*

Funding is the largest hurdle in this project. We will continue to seek funding from the NSF. We met with a program officer at NSF, received a positive response, and are awaiting further communication from him.

4. *SRC should discuss with AAPM the possibility of adding CAMPEP approved graduate Medical Physics departments to degree surveys.*

There are 40 CAMPEP approved medical physics programs in the U.S. and Canada, but only a handful are at physics degree-granting departments, which is the group we contact annually in the SRC Enrollment & Degree Survey. We exchanged emails with William Hendee, the current president of CAMPEP, and asked him about the potential value of our surveying CAMPEP programs. We learned that CAMPEP already collects data annually from each of their programs and, in fact, their data collection is more extensive than the benchmark data we were proposing to collect on their behalf.

AIP | Statistical Research Center

Advisory Committee Meeting

March 1, 2013
Conference Room B
American Center for Physics
College Park, MD

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STATISTICAL RESEARCH CENTER
ADVISORY COMMITTEE AGENDA
American Institute of Physics
College Park, MD
March 1, 2013

8:00 AM **BREAKFAST** - ACP Rotunda

8:30 AM **Plenary Session - *Conference Room A***
Opening Remarks from Fred Dylla and Cathy O'Riordan

9:30 AM **SRC Advisory Committee Convenes - *Conference Room B***
Introductory comments from Advisory Committee chair - Laura Kay
Introductions of Advisory Committee Members
Overview of the past year ***(Section 1)*** - Roman Czujko and Rachel Ivie
SRC Research Portfolio ***(Section 1)*** – Roman and Rachel

10:00 AM **Education Studies *(Section 2)***
Enrollments & Degrees - Patrick Mulvey
International experiences of physics students who are U.S. citizens – Patrick
Survey of High School Physics Teachers – Susan White
Two-Year College Survey - Susan
Persistence and attrition of physics undergraduate proposal – Rachel and Susan

11:00 AM **BREAK**

11:15 AM **Discussion on Educational Related Issues**
Are more physics departments being threatened with closure? - Patrick

11:30 AM **Dissemination (*Section 3)***
Reports, *Physics Trends* flyers, talks, *e-Update* data alert service,
printed publications – Rachel
SRC website – Mark McFarling and Judith Mulvey
Sessions on diversity at 2013 AIP Assembly of Society Officers – Roman

12:00 PM **LUNCH**

1:00 PM **Employment Studies (*Section 4)***
Career Pathways Project – Roman
Survey of Physics PhDs 10-15 years after degree – Garrett Anderson
Initial Employment Surveys – Patrick

1:45 PM **Discussion on Employment Related Issues *(Section 4)*** – Rachel
What can we learn from a study of climate for underrepresented faculty?

2:00 PM **Strategic Planning *(Section 5)*** – Roman
Strategic Planning, SRC Audiences, Priorities & Implementation Plan
Discussion: Does the Strategic Plan set the right direction and what are the next steps for SRC?

2:30 PM **Review of Recommendations from 2012 Advisory Committee *(Section 1)***

2:45 PM **BREAK**

3:00 PM **Executive Session** - Advisory Committee with Roman Czujko and Rachel Ivie

3:20 PM **Executive Session** - Advisory Committee

Statistical Research Center Advisory Committee
2013 Table of Contents

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AMERICAN INSTITUTE OF PHYSICS

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AMEX CORPORATE ACCOUNT, TRAVEL EXPENSE VOUCHER

Name _____ **Date** _____

Address _____ **Phone** _____

_____ **Acct Name** Travel - Advisory Committee

_____ **Acct No.** 01-400-44100-650150-0000000-0-0

Purpose of Travel (include person(s) visited and/or nature of visit or meeting)

Attend the 2013 Advisory Committee Meeting of the Statistical Research Center in College Park, MD

ITINERARY

Line No.	DESCRIPTION	From\To Date	From\To Date	From\To Date	From\To Date	From\To Date	From\To Date	Line Total
1A	Personal Car Mileage (by Day)							
1B	Personal Car (miles x.56.5 rate)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Air/Rail Fare							0.00
3	Car Rental							0.00
4	Parking/Tolls							0.00
5	Cab/Metro Fares							0.00
6	Lodging							0.00
7	Meals							0.00
8	Telephone							0.00
9	Miscellaneous							0.00
TOTALS ---------->		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Remarks (Include line no.)	Line No.		
	10	Less: Travel Advance	
	11	Less: AMEX Charges	
	12	**Amount Due Claimant (Amount Due AIP)**	0.00
	13	**Amount Due AIP (Attach Check)**	

Date	Description (Corporate AMEX)	Amount	Date	Description (AMEX)	Amount
	For Internal Office Use Only.				
				Total AMEX Charges ----->	

I certify that the above charges, incurred by me, are correct and proper.

CLAIMANT'S SIGNATURE DATE APPROVED DATE

Please Return Completed Form and Receipts to: Judith Mulvey, Statistical Research Center, American Institute of Physics, 1 Physics Ellipse, College Park, MD 20740-3843

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Section 1

Overview

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YEAR IN REVIEW

Rachel Ivie and Roman Czujko

Once again, we are pleased to announce that record numbers of people earned physics bachelors, astronomy bachelors and physics PhDs in the academic year 2010-11. These numbers broke the records set by the classes of 2009-10 and represent 73% growth in physics bachelor's degree production since a recent low in 1999. Despite this tremendous growth, concern about the viability of small departments in public universities continues. At our meeting, Patrick Mulvey will provide an update on the latest physics department closures.

Over the last few years, AIP has struggled with budget issues, and one of the consequences was that the SRC temporarily lost one staff position in 2011. Nevertheless, we have continued to be very productive in 2012, working on all five core surveys (High School Physics, Enrollments and Degrees, Initial Employment, Graduate Student Survey, and Academic Workforce). Also we:

- published 9 reports in the *focus on* series,
- published 2 Rosters with data on every physics and astronomy department in the U.S.,
- worked on 9 contract surveys,
- collaborated on 6 studies,
- gave 13 invited talks, and
- received 95,000 visits to our website.

In spite of our successes, budgetary and staff limitations continue to impact our work. For calendar year 2012, we had to postpone work on several studies recommended to us by last year's Advisory Committee: the U.S. academic and government employment study and the study of attrition and persistence among undergraduate physics majors.

Our Advisory Committee meeting this year will focus on four themes: education, employment, dissemination, and our strategic plan.

Education: The High School Teacher Survey, one of SRC's core surveys, is directed by Susan White. This survey series has provided essential data to the physics community since its inception in 1986 and is now conducted every fourth year. During 2012, we published two reports in our *focus on* series about high school physics. The data collection phase of the next high school teacher survey began in the fall of 2012. We also completed the Two-year College Survey in 2012, in collaboration with the AAPT and the American Chemical Society.

Another core survey, Enrollments and Degrees, has been conducted annually for more than 50 years. This survey, directed by Patrick Mulvey, documents changes in enrollments and degrees in physics and astronomy at both the undergraduate and graduate levels. During 2012, we published one report in the *focus on* series and two rosters using data from the Enrollments and

Degrees Survey. This survey is the source of data about the record high number of degrees awarded.

A third core survey, the Graduate Student Survey, is also directed by Patrick and documents characteristics of first year graduate students in physics and astronomy departments. During 2012, we published one report in the *focus on* series about graduate students from the 2008 and 2010 surveys.

Employment: The employment component of our research portfolio includes two core surveys, the Initial Employment Survey and the Academic Workforce Survey. The Initial Employment Survey of physics and astronomy graduates, conducted annually by Patrick Mulvey, provides important data on the current health of the job market for new degree recipients in physics and astronomy at all levels. This year, a wealth of data about graduates' first jobs became available, as we published four *focus on* reports from the Initial Employment Survey.

The academic job market is an essential barometer of the vitality of physics. Rachel's team conducts a biennial survey of all physics and astronomy departments with special emphasis on staff turnover, hiring and recruitment. This survey is the source of counts of faculty members, including the number of women and minority faculty members. During 2012, we collected data for this survey and published one *focus on* from the 2010 data.

In addition, Roman is a co-PI on a NSF grant, The Career Pathways Project. This project looks at the features of departments that are very successful in placing their physics bachelors in STEM positions. It will conduct workshops at professional society meetings and regional SPS meetings to disseminate information about how departments can better prepare their majors for the workforce.

We are very excited about our study of physics PhDs who graduated 10-15 years ago. We launched this project at the request of the Advisory Committee several years ago. We have completed data collection and will be releasing reports soon. Garrett Anderson will describe the results from the first report, which details the careers of physicists working in the private sector. The vast majority of physicists working in the private sector are not members of one of AIP's Member Societies, so there is little information about them. This study will provide unique and valuable data about what they do and how their career paths evolved.

Dissemination: Now in its third year, the *focus on* series continues to be well received. We published nine reports in the *focus on* series during 2012. Increased dissemination is one of the priorities set for us in the strategic plan, so we have included this topic on this year's agenda. We will also discuss upgrades of our website and content management system.

***Strategic plan**:* AIP is in the process of developing a strategic plan. This year, we are asking for your input on the priorities set for the SRC in the strategic plan. Will these priorities take us in the direction that we need to go to meet the community's data needs?

Collaborations and contract surveys: Although time will not permit us to discuss these during our meeting, we worked on nine contract surveys and six collaborative projects during 2012. Many of our contract surveys are conducted for repeat customers, and we view this as a strong indicator of our ability to do high quality research at affordable prices. In addition to providing our research expertise to the staff and members of AIP Member Societies, we also work with other scientific groups, such as the American Chemical Society. Finally, our work with the American Academy of Arts & Sciences continues as we are conducting a second survey of humanities departments for them. The first round of this survey was conducted four years ago and examined trends in seven fields. The second survey was extended to cover a dozen fields.

Concluding comments: During this year's meeting, we will ask for your input and advice on how well we are meeting the data needs of our core audiences. We ask you to contribute any ideas you have on data needs related to education and employment. We will have focused discussions on the closures of physics departments, a study of climate for underrepresented faculty members, and our strategic plan. We ask you to keep in mind the limitations placed on our activities by budget and staff, along with the need to take contract jobs. Finally, we **thank you** for your contribution to the work of the SRC. You truly help us keep our finger on the pulse of the physics community.

THE SRC MISSION

Roman Czujko and Rachel Ivie

The Statistical Research Center has a two-fold mission:

- to document and report on the trends in the comprehensive issues of education and employment of physicists, astronomers and related scientists; and
- to provide research services to other AIP units, AIP Member Societies, and the scientific community.

We carry out the first part of our mission by gathering and disseminating data on all stages of the educational system from high school through the PhD, as well as all stages of scientists' careers from their initial employment through the retirement process. We typically fulfill this part of our mission by conducting our own surveys and reporting on the findings. When appropriate, we also analyze data collected by reliable, national groups including the National Science Foundation, the U.S. Department of Education, and the Bureau of Labor Statistics.

SRC fulfills the second part of its mission by offering our survey research expertise to scientific organizations to assist them in addressing the information needs of their constituents and customers. We collaborate with and conduct surveys for other groups and for individual members of the physics, astronomy and geoscience communities. We serve on committees and review questionnaires, proposals and scientific articles in response to requests from the scientific community. In a typical year, the SRC will work on more than a dozen studies for other AIP units or external groups, serve on several scientific task forces or committees, and author articles for publication in scientific magazines and newsletters.

The document in this section titled "SRC Research Portfolio" describes the types of research services we have provided since the last Advisory Committee meeting, the clients and sponsoring organizations that requested those services, and how these studies fit into our overall research agenda.

THE ROLE OF THE ADVISORY COMMITTEE

Roman Czujko and Rachel Ivie

On a formal level, the Advisory Committee advises AIP management and reports to the Executive Director. The Advisory Committee of the Statistical Research Center provides review, advice and recommendations concerning research studies and related programs. It assesses the quality of SRC's activities and the extent to which those activities address the SRC's mission.

In practice, the SRC uses its Advisory Committee during the annual meeting and throughout the year to identify the contemporary data needs of our community and to evaluate the extent to which our activities are addressing those needs. We send updates on our activities to committee members in the form of ***eUpdates*** and copies of status reports that we author for the Governing Board. We also send e-mails to committee members asking for advice on topics of contemporary concern. SRC staff members rely on the unique perspective of each Advisory Committee member as one way of identifying emerging trends and, thus, staying ahead of the future data needs of our constituents and audiences. The Committee provides the SRC with guidance in prioritizing our research agenda and in assessing the relative importance and value of our activities. For example, the SRC recently completed a study of physics in two-year colleges in response to the recommendations of our Advisory Committee.

REPORT FROM THE ADVISORY COMMITTEE FOR THE STATISTICAL RESEARCH CENTER

March 9, 2012

Attending: Laura Kay (chair), Renee Diehl, Susan Humphris, Steven McCauley, Marie Plumb, Willie Rockward, Frank Sogandares, John Sweet

SRC Staff Present: Roman Czujko, Rachel Ivie, Patrick Mulvey, Raymond Chu, Susan White, Mark McFarling, Judith Mulvey, Julius Dollison

Guests: John Layman, Tim Cohn, Scott Sommerfeldt, Robert Hilborn

GENERAL COMMENTS: The committee recognizes that senior staff will be heavily involved in issues of strategic planning and re-organization. Notwithstanding, we make the following recommendations:

RECOMMENDATIONS:

1. The SRC should continue its core studies that are of high importance to the community. There is a demand for this information; these studies are what bring people to the AIP SRC website to begin with, e.g. Initial Employment & Salaries, Enrollments & Degrees, Academic Workforce, and High School Physics Teachers.

2. The committee recommends that the SRC develops a research plan for studies of the climate for underrepresented faculty, and the attrition of undergraduate physics majors.

3. The committee recommends that the SRC embark upon the U.S. Academic and Government Employment study

4. The committee recommends that the analysis of the studies in progress (including the 2 Year College Survey, the PhD+10 Survey, and the Global Survey of Physicists) be continued to completion.

SRC STAFF STATUS REPORT ON RECOMMENDATIONS FROM 2012 ADVISORY COMMITTEE

GENERAL COMMENTS: During 2012, SRC senior staff members were heavily involved in developing the Strategic Plan and in implementing a new employee review system. In addition, we were developing a new organizational structure including staff responsibilities and work flow within the division.

RECOMMENDATIONS:

1. *The SRC should continue its core studies that are of high importance to the community. There is a demand for this information; these studies are what bring people to the AIP SRC website to begin with, e.g. Initial Employment & Salaries, Enrollments & Degrees, Academic Workforce, and High School Physics Teachers.*

Each of the core surveys identified in this recommendation were conducted as scheduled during 2012. There will no substantive changes to the questionnaire instruments or to the pool of people who have historically been surveyed by each of these surveys. The changes that were considered all focused on methodological changes that were intended to improve efficiency.

2. *The committee recommends that the SRC develops a research plan for studies of the climate for underrepresented faculty, and the attrition of undergraduate physics majors.*

We recognize that these two issues are of great concern to the community. We were unable to devote senior staff time to developing formal proposals for these studies during 2012. However, working with Advisory Committee members who have expressed interest, we can look for possible funding sources and explore various research strategies to address these questions.

Several years ago, we submitted unsuccessful proposals to the NSF Gender in Science and Engineering program for a study of sex differences in attrition. Previous discussions with the Advisory Committee have led us in the direction of expanding the study to include underrepresented minority students. We have contacts at an HBCU, community college, and a research university in Florida, all in close proximity to each other. These institutions are interested in submitting a proposal with us. We also plan to develop contacts with similar schools in Maryland or another state for comparison.

During this year's Advisory Committee meeting, we will be asking for advice about a study of climate for underrepresented faculty. We need the Committee's input on the scope of the study, including whom to study and the research questions to address.

3. *The committee recommends that the SRC embark upon the U.S. Academic and Government Employment study*

Academic and government employment are the two largest sectors that have historically employed PhD physicists to conduct research in physics. After a careful and thorough evaluation of our research portfolio, SRC senior staff members have determined that too many years have gone by since we last collected accurate and reliable data about these two sectors.

In reviewing our commitments to core survey, contracts surveys, and collaborations, we have concluded that we simply did not have sufficient staff time available to launch this survey during 2012. We continue to believe that this study would provide unique data on the academic and government workforces and is necessary to complete another report on women in physics. We plan to evaluate whether there is staff time to launch this survey during 2013.

4. *The committee recommends that the analysis of the studies in progress (including the 2 Year College Survey, the PhD+10 Survey, and the Global Survey of Physicists) be continued to completion.*

The 2-Year College Survey was conducted in cooperation with the American Chemical Society. We presented preliminary results at the summer 2012 AAPT meeting, and our first report, which examines course offerings and enrollment, is currently undergoing internal review. We will also produce a second report which examines the number faculty and faculty turnover.

SRC staff members continue to analyze the data collected by both the Global Survey of Physicists and the PhD +10 Survey. During 2012, we published one report from the Global Survey and submitted another to conference proceedings. Rachel Ivie presented findings from the Global Survey four times since the Advisory Committee met in 2012: at a colloquium at NASA Goddard Space Flight Center, at the APS March Meeting, at CERN, and at the American Center for Physics.

We made significant headway in the analyses of the PhD +10 Survey and plan to publish two reports on that study during 2013. Roman Czujko presented preliminary findings from the PhD +10 Survey at the June AAPT/APS Physics Department Chairs meeting.

THE SRC RESEARCH PORTFOLIO

Roman Czujko and Rachel Ivie

Among the outcomes of the recent Strategic Planning exercise was a clearer vision connecting our research portfolio to the audiences we serve, i.e. who we have in mind when we develop or conduct research studies. This document describes the four types of studies that comprise our research portfolio: core studies, studies of contemporary concern, collaborations, and contract surveys. It also describes the audiences that we serve with each of these research activities. Our primary audiences are identified and discussed in a separate document in the Strategic Planning Section of this briefing book.

Core studies: These studies are categorized by four features. They are conducted on a regular schedule; they are funded by AIP; they have been an essential part of the SRC research mission for decades; and the findings from these studies are broadly important across our primary audiences. Our core studies include:

- The Survey of High School Physics Teachers, which is conducted once every four years on all the physics teachers at a sample of all public and private high schools nationwide;
- The Survey of Enrollments and Degrees, which is conducted annually on all physics and astronomy degree-granting departments in the U.S.;
- The Initial Employment Survey, which is conducted annually on all recent bachelors, masters and PhDs in physics and astronomy who left their departments to either enter the workforce or enroll in advanced education at another institution;
- The Academic Workforce Survey, which is conducted biennially on all physics and astronomy degree-granting departments in the U.S;
- The First-Year Graduate Student Survey, which is conducted biennially on all first-year graduate students in physics and astronomy in the U.S.

Studies of Contemporary Concern: Unlike core studies, these studies are not part of a regular series. These projects, which are funded by AIP, are conducted in response to contemporary concerns expressed by our primary audiences. These studies often evolve out of recommendations from the SRC Advisory Committee. Currently, we are conducting the PhD+ 10-15 Study as this type of study. Other studies that are being planned or are under consideration include Persistence and Attrition of Physics Undergraduates, a study of the effects of the 2008 recession on recent PhDs (PhD +5), and the Academic and Government Employment Survey.

Collaborations: Part of the SRC mission is to provide its research and statistical expertise as a service to the community. Collaborations and contract studies are an integral part of fulfilling that portion of our mission.

Collaborations are initiated as a result of discussions with individuals and groups external to the

SRC, are funded in part by external sources, may not be part of a series, and are conducted in response to issues of contemporary concern. Current examples include Physics in the Two-Year Colleges, the Career Pathways Project, the Astronomy Graduate Student Longitudinal Study, and the AAS & AIP Data Sharing Survey (funded by NSF).

Studies we do for other AIP units are a type of collaboration, except that such collaborations did not involve external support. Recent examples of studies we have done for other AIP units include the AIP Journal Author Survey and the AIP Matters Readership Survey.

Contract Studies: Like collaborations, contract projects address issues of contemporary concern, but are done solely on request from clients, usually scientific organizations or PIs on grants. The findings of these studies belong to the sponsoring organizations or PIs. The Contract Studies Section of the Table of Contents in this briefing book identifies the studies that we have started or completed since the last Advisory Committee meeting.

Most of the groups we do contract surveys for are repeat customers, and the surveys are now part of a series. Many of our repeat customers are Member Societies, e.g. AAPM, APS, and OSA. The findings of these studies focus on concerns of direct interest to the staff and members of those societies. Scientific organizations get priority, but we do occasionally conduct surveys for other groups. Recent examples include the Humanities Department Survey conducted on behalf of the American Association of Arts and Sciences and twelve disciplinary societies.

Section 2

Education Studies

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ENROLLMENTS AND DEGREES

Patrick Mulvey and Starr Nicholson

The Enrollments and Degrees survey is an annual census of all degree-granting physics and astronomy departments in the US. This is the Center's longest running survey and the information and long term trend data it provides are among our most frequently requested resources. Physics is a comparatively small field which gets lost among the data collected at the national level by other organizations. It necessitates a focused and targeted data collection effort to properly understand the details relating to post-secondary physics education in the U.S.

This survey has two distinct components: 1) Tabulating the number of students enrolled and receiving degrees at different levels within each department. It includes a demographic breakdown by U.S. citizenship, gender, and race. 2) The collection of names and contact information for the previous year's degree recipients at all levels, as well as, current senior and graduate-level students.

The collection of names and contact information is the first phase of three other SRC core surveys. Our annual follow-up surveys of recent degree recipients and the periodic surveys of undergraduate and graduate-level students utilize the contact information we gather as part of the Enrollments and Degrees survey. Because these are population surveys, the need to get complete and accurate information from departments is essential. Collecting this information continues to be extremely challenging.

As of this writing, data collection for the class of 2012 is coming to a close and we anticipate a response rate of about 95%, which is typical for this survey. A great deal of effort is put into obtaining a high response rate and ensuring the accuracy of the data reported. As a result, this survey requires considerable staff time to conduct and we budget for additional part-time staff to assist with telephone follow-ups and data entry.

The data gathered from the Enrollments and Degrees survey is published in a series of ***focus on***s. An example can be found at: ***focus on* Physics Bachelor's Degrees**. Two additional publications come directly from the data collected in this survey. The *Physics and Astronomy Rosters* are school-by-school listings of all degree-granting physics and astronomy departments in the US. They include basic enrollment and degree data for each department. The latest Rosters can be found at: **Roster of Physics Departments** and **Roster of Astronomy Departments.**

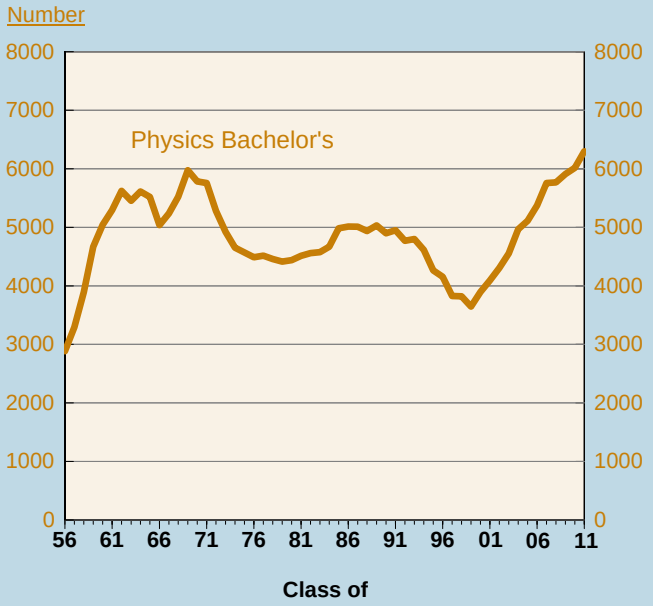
The all-time highs in degree production seen in the class of 2010 have been exceeded by the class of 2011 and due to enrollment trends, they are anticipated to continue to rise for the class of 2012.

Record degree production reached in the class of 2011.

- Physics bachelor's reached 6,296 degrees conferred.
- Astronomy bachelor's reached 408 degrees conferred.
- Physics PhDs reached 1,688 doctorates.

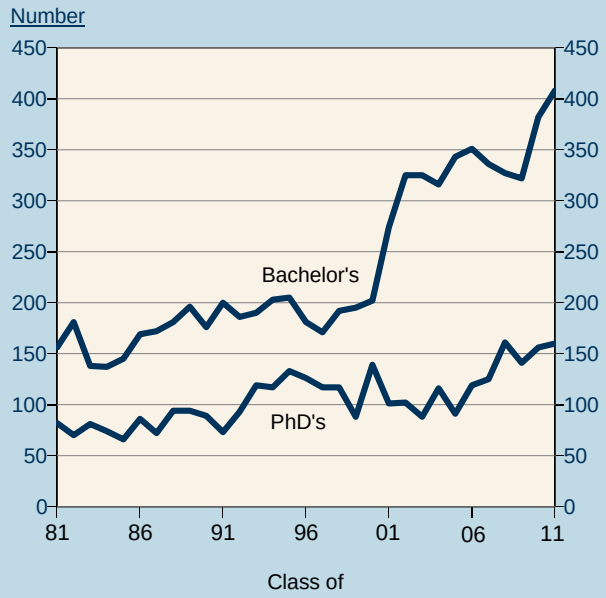
Some of the regularly cited trend data that results from this annual survey follow this write-up.

Physics Bachelor's Produced in the US, 1956 to 2011.



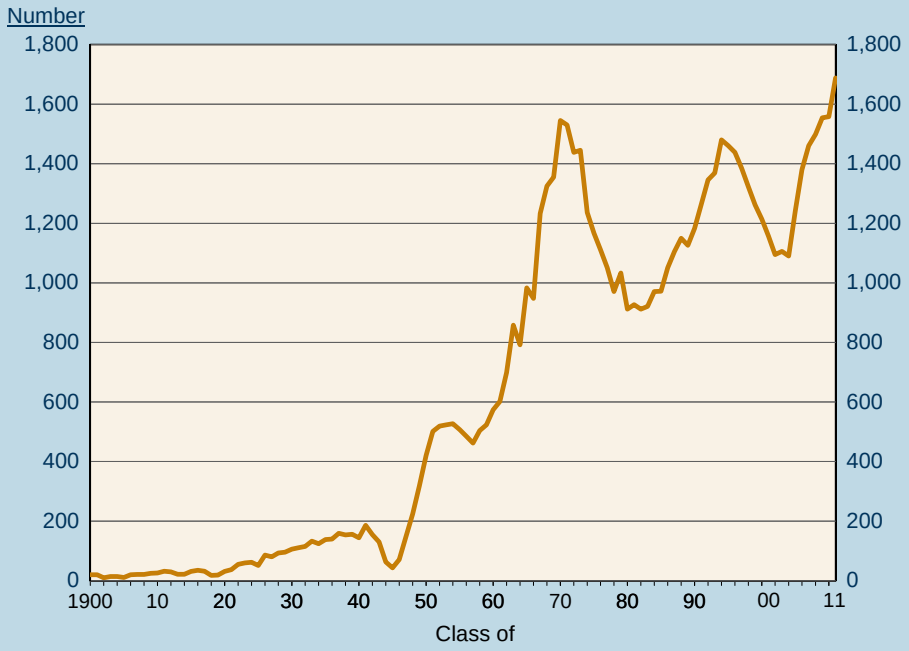
AIP Statistical Research Center, Enrollments and Degrees Survey.

Astronomy Bachelor's and Doctorates Awarded in the US, 1981-2011.



AIP Statistical Research Center, Enrollments and Degrees Survey.

Physics PhD's Conferred in the US, 1900 to 2011.



Sources: ACE (1900-1919), NAS (1920-1961), AIP (1962-2011)

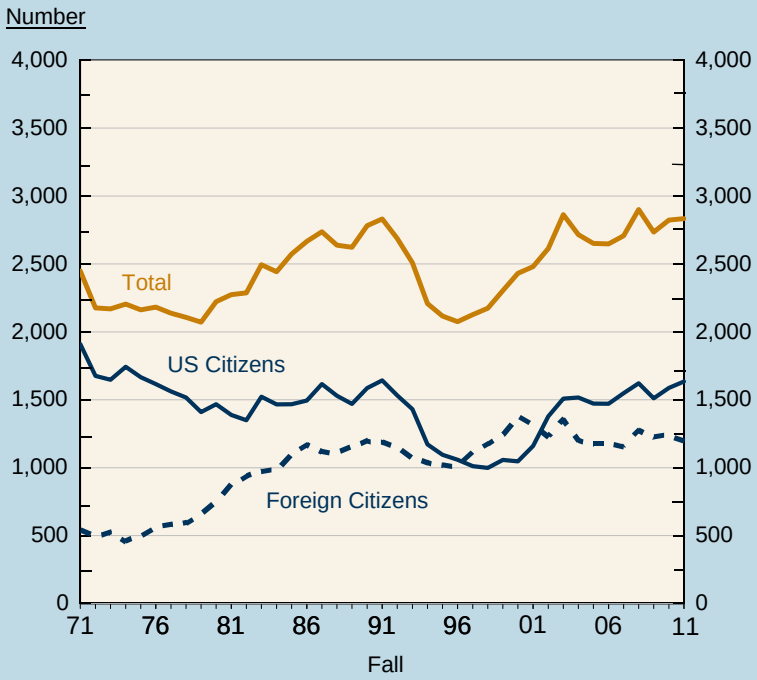
AIP Statistical Research Center, Enrollments and Degrees Survey.

Percent of Bachelor's, Master's and Doctorates in Physics Earned by Women, 1981-2011.

Note: A form change occured in 1994 resulting in a more accurate representation of women among physics bachelors. Some of the increase in 1994 only, may be a result of that change.

AIP Statistical Research Center, Enrollments and Degrees Survey.

First-Year Graduate Physics Student Enrollments at PhD-Granting Physics Departments, Fall 1971 to Fall 2011.



AIP Statistical Research Center, Enrollments and Degrees Survey.

INTERNATIONAL EXPERIENCES

Patrick Mulvey

At the 2010 Advisory Committee meeting, one of the committee members started a discussion about the international experiences of physics undergraduates. On one hand, many colleges and universities now encourage study abroad. On the other hand, physics can readily be referred to as an international discipline. Yet there are no data on the international experiences of physics undergraduates. As a result of discussions, the SRC added a module to its existing follow-up surveys sent to the class of 2011 and asked to what extent undergraduate or graduate level students had an international experience. Only US citizens who were born in the US were presented the international experience questions. Naturalized citizens would by definition have had an international experience. The international experience module is being repeated on the surveys of degree recipients in the class of 2012.

Our primary interest centered on study and research experiences abroad, but we decided to take a broader view and we also inquired about significant travel and conference attendance abroad. Bachelor's degree recipients were asked if they had any international experiences while an undergraduate student. Master's and PhD recipients were asked about any international experiences since earning their bachelor's degrees.

Seventeen percent of the physics bachelor's had either studied for one or more months and/or had done research for two or more weeks outside the U.S.

International Experiences of Physics Bachelor's, Class of 2011.

Percent	
73	None
17	Traveled outside the United States for one or more months
12	Studied outside the United States for one or more months
8	Did research outside the United States for two or more weeks
7	Worked or volunteered outside the United States for one or more months
4	Attended a conference outside the United States
1,449	Total number of respondents

Adds to more than 100% as respondents were permitted to choose more than one international experience.
Table is limited to U.S. citizens who were born in the U.S.

www.aip.org/statistics

Some of the degree recipients used “other” to indicate an international experience that did not meet the duration cutoffs listed in the other choices provided and are not included in the table.

As is frequently the case with data pertaining to exiting physics master’s, their small numbers coupled with the difficulty we have in reaching these individuals, does not enable us to say very much regarding the international experiences of these degree recipients. In brief, we heard from 113 physics master’s who were U.S. citizens, born in the U.S, and left their physics departments after earning their degrees. About a quarter of these individuals indicated having an international experience since earning their undergraduate degree. By repeating the question set in the next survey cycle and combining the two years of data, we hope to be able to develop a clearer picture of this group’s international experiences.

The physics PhD class of 2011 was also presented the international experience module. The data from recent PhD recipients has not yet been analyzed.

In preparing to add the international experience module to the follow-up survey, we needed to add questions to enable us to properly direct the question set to only U.S. citizens who were born in the U.S. As a result of the additional questions we now have information on the proportion of degree recipients who were U.S. citizens at the time of their degrees, but who were born outside the U.S.

The proportion of U.S. citizens among new physics bachelor’s degree recipients has been around 94% for many years. We now estimate that about 94% of these U.S. citizens were born in the U.S. and only 6% were born abroad. The non-U.S. citizens are comprised of students on temporary visas (~75%) and individuals with permanent resident status (~25%). These questions are being asked again of the class of 2012 and we will have higher confidence in our findings after we increase the number of respondents providing data.

HIGH SCHOOL PHYSICS TEACHER SURVEY

Susan White and Casey Langer Tesfaye

The Nationwide Survey of High School Physics Teachers is a quadrennial survey. The survey began in 1986-87, and the current round, which marks the eighth iteration, is currently underway. During the fall (and early spring) semester, we determine whether or not each of the schools in our sample (~3,900 this year) offer physics. In the spring, we contact the physics teachers at the schools where physics is offered.

The 2008-09 Survey

We have written a series of ***focus on*** reports which highlight findings from the 2008-09 survey. Since our last meeting, we have published two:

- ***focus on* High School Teacher Preparation (February 2012)**
- ***focus on* Challenges High School Teachers Face (May 2012)**

We have published nine ***focus on*** reports based on data from the 2008-09 survey.

This past year, we sent a postcard to all of the schools in our sample highlighting the February 2012 report. This is part of an ongoing effort to maintain contact with the schools. In past years, we have sent postcards to participating schools to notify them of recent publications twice each school year, once in the fall and once in the spring. We also sent a holiday postcard to the principals in December. We hope that this will not only make our results more widely known, but also foster better relationships with our sample schools, teachers, and principals.

The 2012-13 Survey

We changed our mechanics slightly this round. In the fall, we conducted web searches for all the schools in our sample to determine which schools offer physics. For those schools where we could identify a physics teacher, we collected the teacher's contact information. We contacted the remaining schools by phone, e-mail, and mail to determine whether the school offers physics this year; if so, we also requested the names and e-mail addresses of teachers who teach at least one physics class. We are in the midst of contacting teachers and inviting them to complete a questionnaire.

Research Approval Requirements and Refusals

The survey has been generally well-received by selected schools. However, this year the State of Hawaii has denied our request to conduct research because they did not find the study relevant to their needs. There is only one school district for the entire state, so we will not be able to include any data from the state of Hawaii. Several other schools have refused to participate. The sample is large enough that we should be able to provide reliable results despite the omission of some

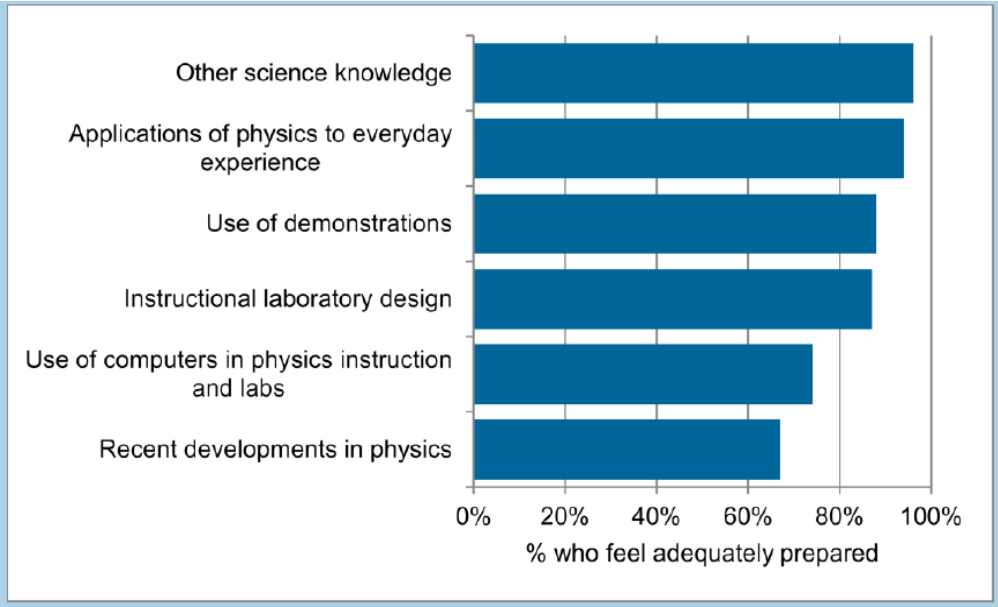
schools. However, these refusals – both at the district and individual school level – could portend an increased reluctance among schools and teachers to participate in studies like ours. Schools cite an overabundance of data requests, a suspicion that the survey is actually a veiled sales pitch, and/or uncertainty about the usefulness of the results when they refuse to participate.

It is likely that school databases will ultimately advance to the point that we do not need to conduct this study to determine enrollments in high school physics classes. However, enrollments are not the sole focus of the study. Even with advances in databases, it seems unrealistic to assume that we will be able to capture the richness of the data about teacher backgrounds and textbook ratings without doing this study. It is not clear what we can do to make the study more useful to individual schools and districts. They already know how many students take physics, where physics is offered, and who teaches it.

Some Findings from Recent Reports

Almost all high school physics teachers feel at least adequately prepared to teach other science knowledge and the applications of physics to everyday experience. Less than 70% of the teachers fell at least adequately prepared to discuss recent developments in physics.

Teacher Self-Assessed Level of Preparation:
Respondents Who Feel Adequately or Well Prepared
2008-09 US High School Physics Teachers



Almost every teacher uses lecture, and about one-third use lecture more than any other teaching activity.

Teaching Activities used by High School Physics Teachers
In US High Schools, 2008-09

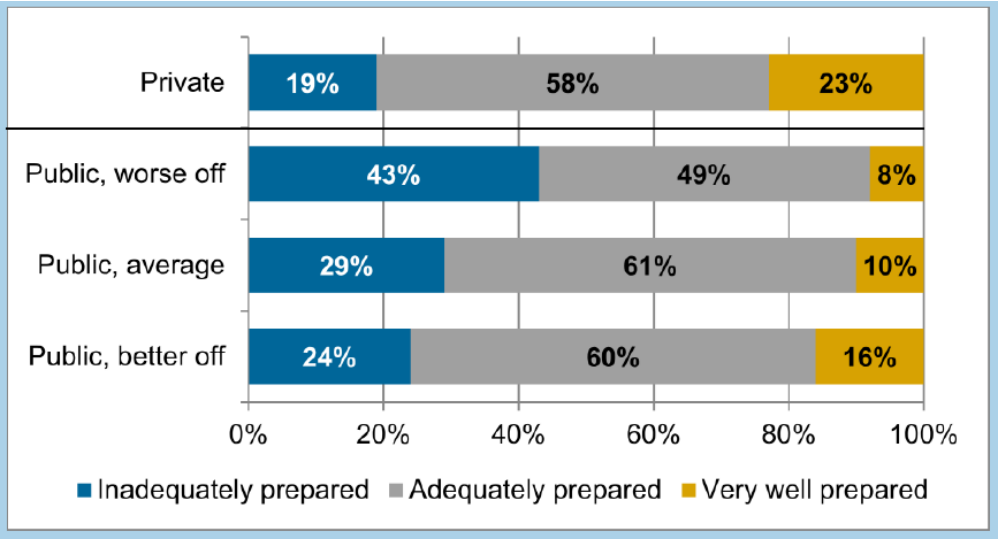
Activity	% of Teachers reporting ever using this activity	% of Teachers reporting this as the most used activity*
Traditional lecture	95	34
Class solves or discusses quantitative or mathematical problems	95	21
Students required to work together	93	10
Students design / perform experiments / activities	88	12
Class solves or discusses qualitative or conceptual problems	81	3
Students discuss ideas in small groups	72	6
Students use activity-based guided-inquiry curricular materials	65	10
Students present "findings" to class	45	1
Pre-class assessment drives instruction	24	1

*This column does not sum to 100% because a few teachers reported using other activities.

We asked teachers their perception of their students' level of math preparation. Teachers at private schools generally rated the math backgrounds of their students higher than teachers from public schools, especially public schools in which students are worse off socioeconomically.

Teachers' Perceptions of Student Math Preparation: Private Schools and Public Schools by SES*

2008-09 US High School Physics Teachers



* Our socioeconomic status (SES) measure is the teacher / principal assessment of student economic circumstances relative to those of students at other schools in the local area.

PHYSICS IN TWO-YEAR COLLEGES

Susan White and Raymond Chu

The Statistical Research Center has conducted several studies of two-year colleges (TYC). We conducted a two-year college survey in 1996 and updated it in 2001-02. The 1996 study was funded, in part, by the National Science Foundation. The 2001-02 survey was funded internally, much like we are now doing with the PhD + 10 Study. In 2003, we did a survey in support of the study on Strategic Programs for Innovations in Undergraduate Physics at Two-Year Colleges (SPIN-UP/TYC). The SPIN-UP/TYC project was funded by a grant from the National Science Foundation. While these studies provided useful data, the information is now quite dated. In 2012, Dr. Tom O'Kuma from Lee College in Texas identified funding which covered some of the costs of updating the data, and we undertook a survey of physics in two-year colleges.

The TYC Survey

We used the US Department of Education's Integrated Postsecondary Education Data System (IPEDS) to determine the number of two-year colleges which might offer physics. While bachelor's granting institutions have historically offered associate's degrees (ADs), some TYCs now offer bachelor's degrees. So, we could not limit our search to schools that offered only ADs. We did limit our search to schools for which at least 70% of the degrees awarded were ADs. We further restricted the schools to those that averaged awarding at least 25 ADs for each year the school was in operation between 2001 and 2010. This list included 1,199 schools. We excluded 106 of these schools because they had limited academic offerings (Bible schools, schools of fashion merchandising, dramatic arts, and visual arts, for example). Thus, we estimate that there were 1,093 schools which might offer physics.

However, some schools have multiple campuses, and we wanted to use the campus as the basic unit of analysis, not the school. Based on stratified sampling (oversampling the smaller schools) and web searches for the sampled schools, we estimate that there are 1,681 campuses which might offer physics; furthermore, we estimate that 63% of these campuses (1060) do offer physics. This number is little changed from earlier studies; 1,056 campuses offered physics in 1995, and 1,072 campuses offered physics in 2001. Even though physics is offered on 63% of the campuses, it is important to note that these campuses account for 88% of the ADs awarded at TYCs between 2001 and 2010.

During the fall of 2011, we attempted to compile a list of administrative units and contacts on each campus where physics is offered in TYCs. We contacted AAPT members who indicated they were TYC faculty members and asked them to help us update the information for their campus and other campuses with which they were familiar. Dr. O'Kuma provided us with a list of e-mail contacts which we also used. We also used an e-mail list provided by the American Chemical Society (ACS). In the spring of 2012, we contacted each of the campuses for which we

had information and asked them to complete an online questionnaire. The areas covered included classes offered and lab components, enrollments, number of faculty and faculty status (full-time or part-time, men or women, and physics-focused or teaching a variety of subjects), typical teaching loads, and faculty turnover.

We received usable responses from 381 campuses, or about 36% of the campuses we believe offer physics. While this response rate is lower than those for our other higher education studies, we believe that it is adequate to insure the integrity of the data. The map below shows the location of the responding campuses.

Location of mainland respondents to 2011 TYC survey

(We received 5 responses from Hawaii that are not depicted here.)

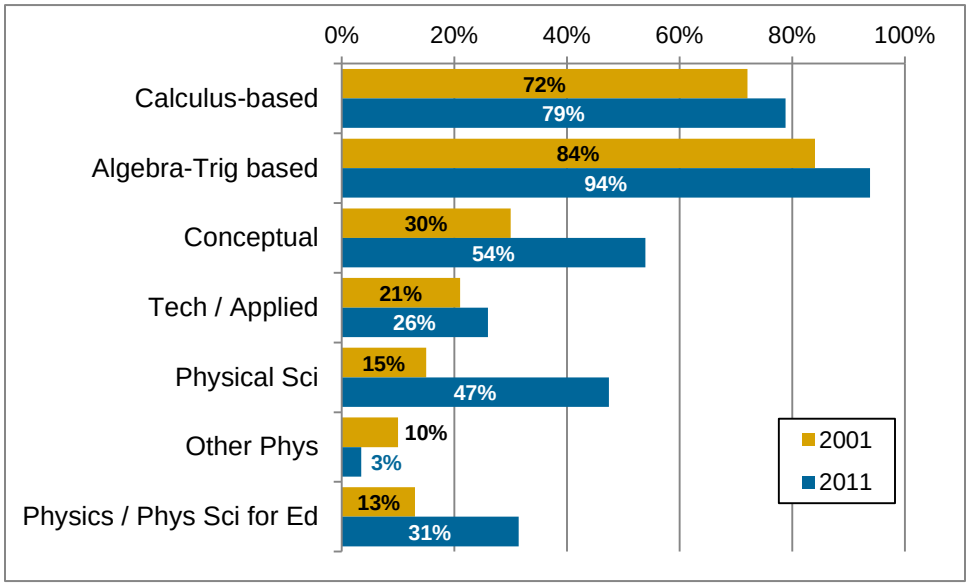
The American Chemical Society Survey

We learned that the American Chemical Society (ACS) was also going to conduct a survey of chemistry in TYCs in the spring of 2012, so we reached out to them because we believed that having two surveys in the field at the same time could compromise both studies. We were responsible for the administration of the questionnaire. The chemistry questionnaire focused on lab safety practices. We provided the chemistry data to ACS in June of 2012.

Results

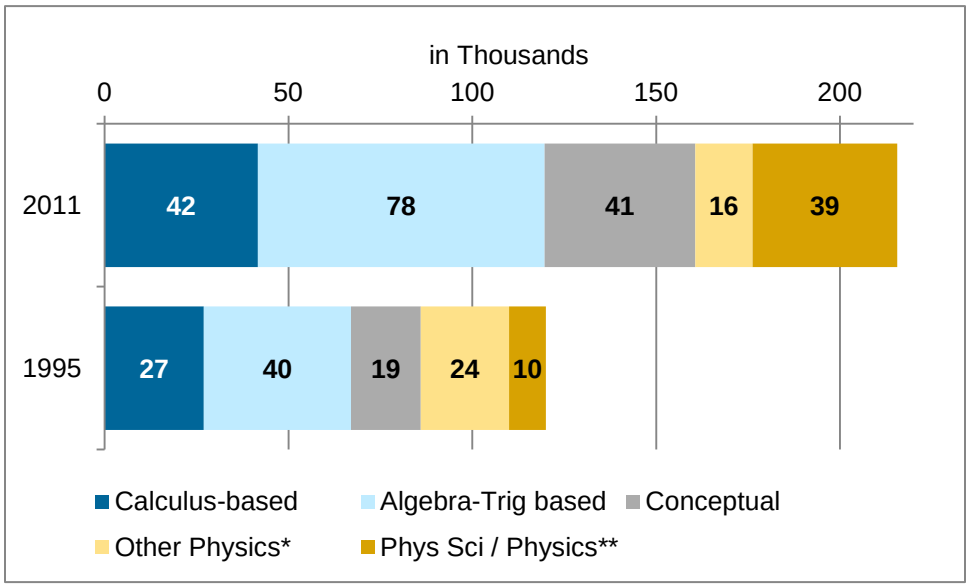
We presented some preliminary findings at the AAPT Summer Meeting in Philadelphia, and the first report, ***focus on* Physics Enrollments in Two-Year Colleges** is currently undergoing internal review. We plan several additional reports examining the number of faculty, faculty status, and faculty turnover. A few highlights are presented below.

Physics* Offerings at TYC Campuses
At TYC Campuses which Offer Any Physics
By Type of Class, 2001 & 2011



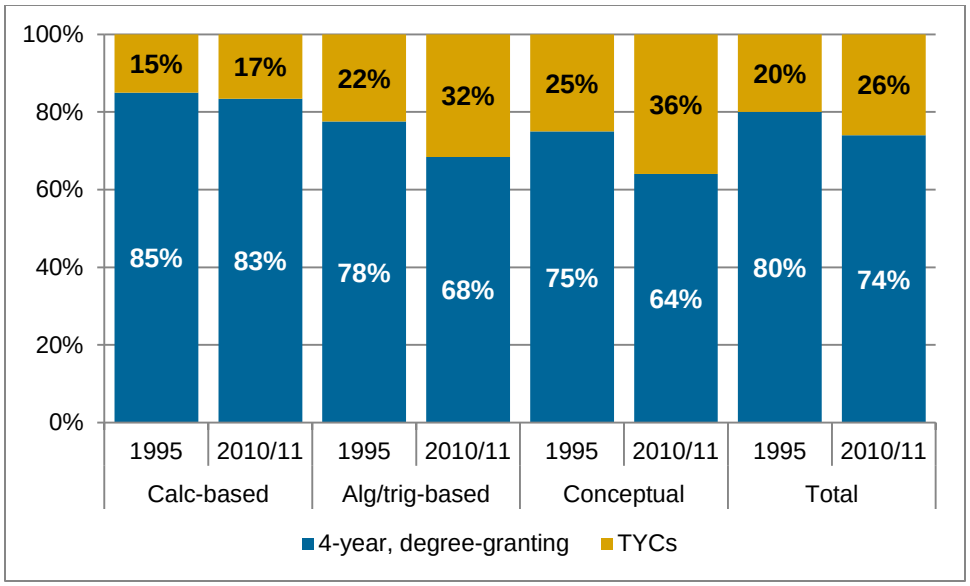
*Includes physical science classes which are at least 50% physics

Number of Students Enrolled in Physics^ Classes in Two-Year Colleges
By Academic Year & Type of Class



^ Includes physical science classes which are at least 50% physics
*Includes Technical / applied physics
** Includes physical science and physics for education majors
1995 data is for the 1995-96 academic year
2011 data is for the 2011-12 academic year

Total Student Enrollment in Physics Courses
By Type of Institution



The enrollment data for four-year schools is for physics-degree-granting departments only.
The 2010 data are the most recent data available for four-year colleges.

PERSISTENCE AND ATTRITION FOR PHYSICS MAJORS

Rachel Ivie and Susan White

From our data, we know that the main juncture at which women drop out of physics is somewhere in the period between high school physics and attainment of the bachelor's degree. About half of high school physics students are female, but less than one-quarter of physics bachelor's degrees are earned by women. However, a more precise drop-off point is not known – is it prior to or during college?

Past Efforts. We submitted several grant proposals to NSF's Gender in Science and Engineering Program to fund a study of these issues. The proposal was a collaborative effort between the University of Chicago and the SRC. We planned to design and implement a longitudinal study to determine whether the under-representation of women in physics among undergraduate degree recipients is the result of decisions made prior to college entry, experiences encountered by undergraduates, or a combination of these factors. The target population for the study included all students in calculus-based introductory physics, both male and female, at three universities that were chosen because they are all selective research universities. We wanted to minimize the possibility that differences in the findings are caused by differences in the types of institutions.

We proposed to measure students' interest in majoring in physics during their first calculus-based physics course using surveys. Using the data acquired in our surveys, we could identify students who expressed an initial interest in physics, but later decided not to continue. We wanted to examine the factors that contributed to this decision. We also proposed to conduct individual interviews of students leaving physics as well as students completing degrees in physics. We proposed to examine whether the pathways to a physics degree are significantly different for male and female students. We believe this project is worthwhile because the lack of data on this process represents a real barrier to designing effective programs that will increase the participation of women in physics. Although our proposals received positive reviews, the project has not been funded by NSF.

Expansion to Other Types of Institutions. At the 2011 SRC Advisory committee meeting, we discussed expanding the study to include Minority Serving Institutions so that we can also collect data on minority students' reasons for persistence in and attrition out of physics. Because of staff constraints, we were not able to begin work on a new proposal during 2012.

Current Status. We have had conversations with Dr. Paul Cottle at Florida State University (FSU) about participating in this study with us. Recently, he has worked with the physics department at Florida A&M University (FAMU), which is an HBCU, and the physics department chair, Charles Weatherford, on a NSF STEP grant (Science, Technology, Engineering, and Mathematics Talent Expansion Program). Tallahassee Community College

(TCC) also participated in the STEP grant. Currently, both FSU and FAMU are committed to working with us to meet with program officers at funding agencies to explore opportunities for funding. We hope to include TCC, too. This would allow us to examine attrition and retention among students who take introductory physics at two-year colleges in addition to those who start at four-year schools.

To further strengthen the project, we would like to include a similar group of schools in another state. We have talked briefly with Anthony Johnson at University of Maryland – Baltimore County (UMBC). We may include UMBC, Morgan State University, and the Community College of Baltimore County. Our goal for 2013 is to meet with program officers and obtain feedback to help us write a strong proposal. We anticipate writing the proposal during 2014.

GRADUATE STUDENT SURVEY

Patrick Mulvey

The SRC has been surveying physics and astronomy graduate students for over four decades with its Graduate Student Survey (GSS). The survey is usually conducted of students who are new to a department's graduate program, but it periodically targets the entire graduate student population. This is an online-only survey that is not conducted every year. The survey was last sent to students who were in their first year of study during the 2009-10 academic year. The names and e-mails used to contact students are gathered as part of our Enrollments and Degrees Survey.

The survey gathers data that covers student demographics, educational background, subfield of study, theoretical or experimental emphasis, and long-term career goals. We ask students how they finance their education, including the type of support they receive, their stipend amount, and whether they received a tuition waiver. There are questions focused on the training they received as first-year students, as well as questions about their relationship with their advisor. There are also questions directed to students that hold teaching assistantships to ascertain if they received any instruction in teaching and if their teaching was supervised or evaluated.

The data from this student-based survey is reported along with data from the Enrollments and Degrees Survey to give a comprehensive picture of graduate-level physics and astronomy education in the U.S. Because a core set of questions is repeated in each survey cycle, we are able to combine the response data from more than one year to strengthening our data reporting confidence. Selected tables from the most recent ***focus on*** from this survey series can be found following this write-up.

Characteristics of First-Year Physics Graduate Students in the U.S. by Highest Degree Awarded by Department, Fall 2007 and Fall 2009 Combined.

	Highest Degree Awarded by Dept	
	MS	PhD
Gender:*		
Male	77%	80%
Female	23	20
Citizenship:*		
U.S.	64%	56%
Foreign	36	44
Median Age	25.2	23.5
Highest Degree Desired:		
PhD	65%	90%
MS	18	4
Unsure	15	5
No Degree Intended	2	1
Enrollment Status:		
Full-time	96%	98%
Part-time	4	2
N	180	2,126

*Data from the AIP Enrollments and Degrees Surveys, fall 2007 and fall 2009.

http://www.aip.org/statistics

Regions and Countries of Citizenship for Non-U.S. First-Year Physics Graduate Students in the U.S., Fall 2007 and Fall 2009 Combined.

	Percent
Asia	**71**
China	39
India	13
South Korea	3
Other Asia	16
Europe	**11**
Americas	**7**
Middle East	**8**
Africa	**3**
Australia, New Zealand	**-**
N	1,049

http://www.aip.org/statistics

Educational Background of First-Year Physics Graduate Students in the U.S. by Citizenship, Fall 2007 and Fall 2009 Combined.

	U.S. Citizens %	Foreign Citizens %
Bachelor's in Physics or Astronomy	94	91
Prior Physics or Astronomy Graduate-Level Training:		
None	75	53
Master's degree from a U.S. institution	6	4
Master's or equivalent degree from foreign institution	1	27
Course work at another U.S. institution	17	4
Course work at a foreign institution	1	13
N	1,185	1,083

http://www.aip.org/statistics

DEPARTMENTS LOSING THEIR DEGREE-GRANTING STATUS

Patrick Mulvey

Through our Enrollments and Degrees survey, the SRC closely monitors the universe of degree-granting physics and astronomy departments in the U.S. Each year a few physics department lose their degree granting status. They are usually small departments at primarily undergraduate institutions. Conversely, colleges and universities occasionally add a degree-granting physics program where one did not exist before. For the purposes of the Enrollments and Degrees survey, we continue to count departments that have lost their physics degree-granting status until the last major either leaves the program or earns a bachelor's degree. New departments are added as we become aware of them, even if they have not yet conferred a degree.

During the past few years there has been considerable discussion concerning the closings of physics programs, especially those mandated by state wide policies requiring a minimum number of degrees per department. Such policies are currently affecting physics programs in Texas and Missouri.

A high profile example of this was a decision of the Texas Higher Education Coordinating Board's (THECB) to eliminate the degree-granting status of academic programs that awarded a total of fewer than 25 bachelor's over 5 consecutive years. Of the 24 state schools in Texas that offered physics degrees, the implementation of this policy resulted in 6 physics departments losing their degree-granting status and 6 other physics departments were placed on probation. Five of the six departments who lost degree-granting status still have a small number of students enrolled in their program and they are being permitted to complete their degrees. The departments that were eliminated are attempting to form a Texas Physics Consortium. The Consortium is an effort to pool institutional resources to provide an online physics bachelor's degree to students across Texas. The Consortium is awaiting approval of the THECB.

During the 2 previous academic years (2010-11 and 2011-12), 12 departments lost physics degree-granting status nationwide and 3 departments have added a physics degree. All but one of the discontinued programs offered a bachelor's as their highest physics degree. Two of the departments that lost their programs were at a Historically Black College or University (HBCU), of which there are only 30 that still offer physics degrees. The closing of small departments can have a big impact on minority serving institutions.

Listed below are the 12 institutions that no longer are offering a physics degree as of the last 2 academic years. The exception is University of California, Davis which lost 1 of its 2 PhD-granting physics departments. Many of these departments lost their ability to accept students 2 or 3 years ago and their final students have either left the department or graduated. Only 1 of the 6 departments in Texas that lost their degree-granting status is listed, the remaining 5 still have enrolled majors and will be removed when those majors graduate or leave.

Programs No Longer Offering Degrees

Academic year 2010-11	Academic year 2011-12
Bemidji State U (MN)	Midwestern State U (TX)
Eastern OR U	Northwestern St U (LA)
Minot State U (ND)	St. Catherine U (MN)
Northwest MO State U	Tenn State U (HBCU)
U of CA, Davis (Applied)	U of Central MO
Virginia State U (HBCU)	Wesleyan Coll (GA)

Newly Added Programs

Academic year 2010-11	Academic year 2011-12
None	Cal State U-Channel Islands
	Cal State U-San Marcos
	High Point U (NC)

During the past decade there have been 23 colleges and universities that have added a degree-granting physics program and 40 that have eliminated one, resulting in a net loss of 17 (2%) programs.

It should be noted that the departments that lost their degree granting status were small in terms of the number of bachelor's degrees they awarded. Thus, even though there are now fewer universities and colleges that offer a physics degree compared to ten years ago, the number of physics bachelor's and physics PhDs conferred in the U.S. have reached all-time highs.

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Section 3

Dissemination

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DISSEMINATION

Mark McFarling, Judith Mulvey, Patrick Mulvey, Julius Dollison and Susan White

One of the most important activities the SRC engages in is the dissemination of the findings from our studies. We use many tools to report our work: the SRC website, our ***focus on*** publications, *Physics Trends* flyers, formal presentations, e-Updates, postcards, articles in Member Society publications and SRC studies highlighted in other publications.

Reports

The ***focus on*** series of short, topical reports is our main mode of reporting our findings. The targeted nature of each report enables us to disseminate our findings quickly. These reports are posted as PDFs on our website. The layout makes for a nice printed publication, too. Since our last Advisory Committee meeting, we have published 9 ***focus on*** reports. In addition, we produced our annual **Rosters** of both Physics and Astronomy Departments along with enrollment and degree data, and a report on who has hired physics bachelor's. Each of these is shown below.

focus on **Physics Bachelor's Degrees** (September 2012)
Undergraduate physics data from the AIP Survey of Enrollments and Degrees

focus on **Physics Bachelor's Initial Employment** (September 2012)
Data showing the initial employment outcomes of physics bachelor's

Roster of Physics Departments with Enrollment and Degree Data, 2011 (August 2012)
The most current enrollment and degree data for each degree-granting physics department in the US. Academic year 2010-11 produced more physics bachelor's and more physics PhDs than in any other year in US history

Roster of Astronomy Departments with Enrollment and Degree Data, 2011 (August 2012)
The most current enrollment and degree data for each degree-granting astronomy department in the US. The academic year 2010-11 also produced more astronomy bachelor's than in any other time in US history

Who's Hiring Physics Bachelor's (August 2012)
A state by state listing of companies that hired new physics bachelor's

focus on **First Year Physics Graduate Students** (August 2012)
Data from the 2008 and 2010 Surveys of First-Year Graduate Students

focus on **Physics Doctorates Initial Employment** (June 2012)
Initial outcomes of physics PhD recipients

focus on **Physics Doctorates One Year Later** (July 2012)
Data showing the initial career paths of physics doctorates

focus on **Physics Bachelor's One Year Later** (June 2012)
Data showing the initial career paths of physics bachelors

***focus on* Challenges High School Teachers Face** (May 2012)
We examine issues regarding student preparation and motivation, funding for equipment and supplies, NCLB (No Child Left Behind), and isolation

***focus on* Number of Physics Faculty Members** (April 2012)
Findings from the 2010 Academic Workforce Survey including total number of faculty members and percent employed in temporary or non-tenure track positions

***focus on* High School Physics Teacher preparation** (February 2012)
Data on teacher preparation and classroom activities

Physics Trends Flyers

These small 8 ½ x 11 posters depict data targeted to the interests of either undergraduate or graduate students and are intended to be posted in hallways and public areas of colleges and universities. The flyers have been very successful, and we regularly receive appreciative compliments from department chairs and other physics faculty. The flyers have proven to be a successful way to communicate relevant information to students who may not otherwise have been informed on a topic.

Data presented on the flyers frequently represent a repackaging of what already appears in our reports or other sources. Since the last advisory committee meeting we issued 6 new flyers, 3 in the spring and 3 in the fall. Issues covered in the recent fliers include: starting salaries for physics bachelor's, the representation of women among physics faculty, science and engineering readiness index, number of physics bachelor's earned by women, physics PhDs one year after earning their degrees, and the number of astronomy bachelor's earned.

We mail hard copies of the flyers to approximately 900 recipients. These include chapter advisors of the Society of Physics Students (SPS) and other physics faculty who have explicitly requested copies. An e-Update is sent when new flyers are posted on our web site. Flyers are also distributed at meetings and at other appropriate occasions.

Formal Talks Given by SRC Staff

Over the last 12 months, we have given 13 formal presentations at scientific conferences and meetings. The talks we gave since last year's Advisory Committee meeting covered a broad range of issues including: high school physics, physics in two-year colleges, career paths of physicists, our data, and the global survey.

Topic / Title	Sponsor	Date	Location
Physics in US High Schools: Truths and Untruths	APS	March, 2012	Atlanta, GA
The Global Survey Of Physicists	NASA Goddard	March, 2012	Greenbelt, MD
The Global Survey of Physicists: The Effects of Limited Resources and Opportunities on Women's Careers in Physics	APS	April, 2012	Atlanta, GA
The Effects of Limited Resources and Opportunities on Women's Careers in Physics: Results from the Global Survey of Physicists	CERN	May, 2012	Geneva (Switzerland)
Working Outside the Academy: A Sociologist's Tale	Future Faculty Conference (Howard U.)	June, 2012	Washington, DC
PhD + 10 Survey Results	AAPT/APS	June, 2012	College Park, MD
Physics in Two-Year Colleges: A Closer Look	AAPT	August, 2012	Philadelphia, PA
Working Outside the Academy: A Sociologist's Tale	American Sociological Association	August, 2012	Denver, CO
PhD + 10 Survey Results	AAPT	November, 2012	College Park, MD
Career Pathways (Workshop)	ΣΠΣ	November, 2012	Orlando, FL
Global Survey of Physicists	AIP	November, 2012	College Park, MD
Working Outside the Academy: A Sociologist's Tale	American Sociological Association	December, 2012	webinar
Physicists & Physics: An Overview of Our Data	Northern Virginia Technology Council	February, 2013	Reston, VA

e-Updates

e-Updates is the SRC e-mail notification service. Subscribers are notified whenever a report that covers the topic(s) they have indicated are of interest to them is published.

Since the last advisory committee meeting nine alerts were sent. There are 1,812 subscribers to e-Updates (slightly up from last year). We also send notifications to the physics and astronomy department chairs, (~800) and SPS chapter advisors (~700); if we think that the alert would be of interest to them. Additional groups that are notified are: this Advisory Committee, AIP's Physics Resources Policy Committee, and the AIP Governing Board.

Printed Publications

As we noted last year, budget cuts at AIP forced us to eliminate almost all printed reports. We were able to continue to print and mail copies of the **Rosters** and the ***Physics Trends*** flyers, but we did not print any other reports. We believe that printed documents are vital not only to our dissemination efforts but are important to our data collection efforts as well.

We like to give something back to those who provide us data, and a printed copy of a report which comes from the data they have submitted helps us do both. The Rosters and ***Physics Trends*** flyers are part of this effort. In addition, we printed postcards to mail to the teachers and principals at schools that are in our sample for our Nationwide Survey of High School Physics Teachers. We sent a postcard to all the principals in March of 2012, and we sent holiday cards to all the schools in our sample in December 2012. While technically not printed reports, these mailings served a similar purpose.

Articles Authored by Staff in Member Society Publications

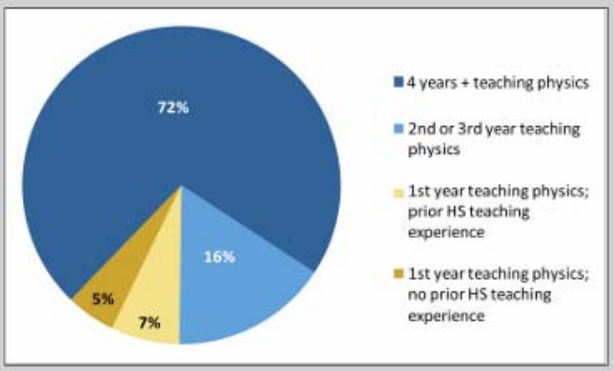
Susan publishes a regular feature in *The Physics Teacher* which highlights findings from the Nationwide Survey of High School Teachers. Nine of these highlights follow.

SRC Studies Highlighted in Other Publications

When ***focus on***s are published, key findings are sent to representatives of *APS News* and *Physics Today*. Several times a year, these publications have announced these findings and provided links to our website to download the reports.

High School Physics Teaching Experience

We divided our high school physics teaching experience into three groups: first-year teaching physics, second or third year teaching physics, and four or more years of experience teaching physics. We did this because everything is new for teachers teaching a course for the first time. The second and third time through the course, teachers learn from past experiences and hone their approaches. By the time a teacher is in the fourth year of teaching a course, he or she is more comfortable with the material and better able to understand the ways in which different approaches work with different topics.

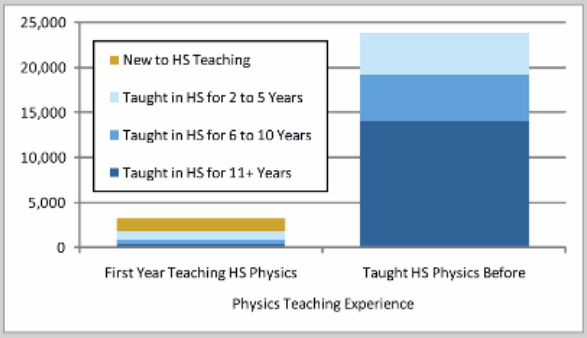


As shown in the figure, almost three-fourths (72%) of high school physics teachers have taught the course for four years or more, and about one high school physics teacher in six (16%) have taught physics for two or three years. Over half (~58%) of the "new" physics teachers — those teaching physics for the first time — have high school teaching experience in other subjects.

In the May issue, we will look at overall high school teaching experience among high school physics teachers. If you have any questions or comments, please contact Susan White at swhite@aip.org. Susan is Research Manager in the Statistical Research Center at the American Institute of Physics and directs the high school survey.

"New" High School Physics Teachers

As we saw in the April issue, "new" high school physics teachers are not necessarily new to high school teaching. A teacher teaching physics for the first time might be in his first year of teaching, or she may already have teaching experience. In most contexts "teacher turnover" considers teachers entering and leaving the teaching profession and is not course-specific. However, when we talk about "new" high school physics teachers, we include teachers with prior teaching experience who are teaching physics for the first time. In fact, more than half of the teachers teaching physics for the first time have prior high school teaching experience. About 12% of the teachers are teaching physics for the first time. One-fourth of these "new" physics teachers have at least six years of high school teaching experience, and one-third have two to five years of high school teaching experience.



Enjoy the summer months. When we return in September, we will look at the aging of the high school physics teaching corps. If you have any questions or comments, please contact Susan White at swhite@aip.org. Susan is Research Manager in the Statistical Research Center at the American Institute of Physics and directs the high school survey.

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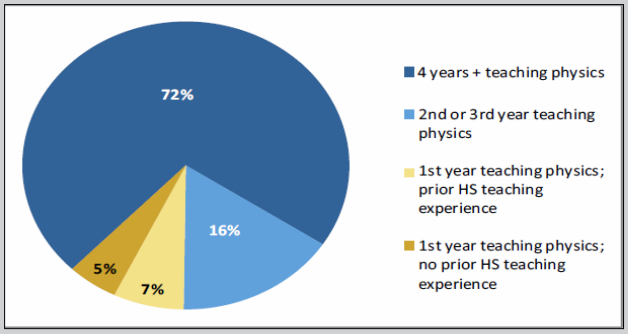

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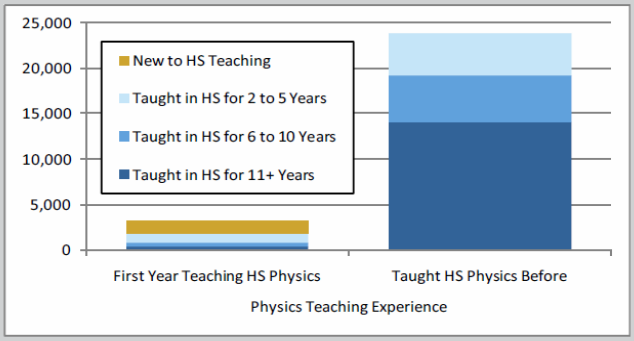

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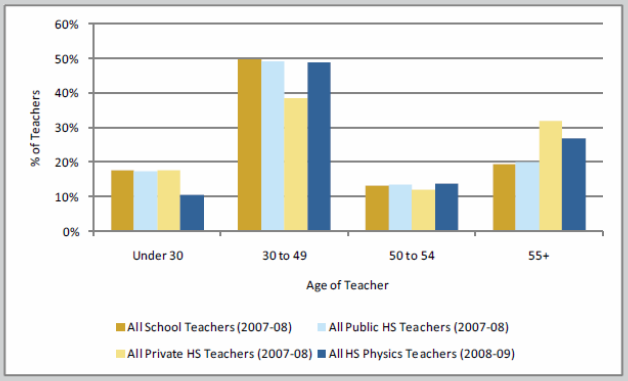
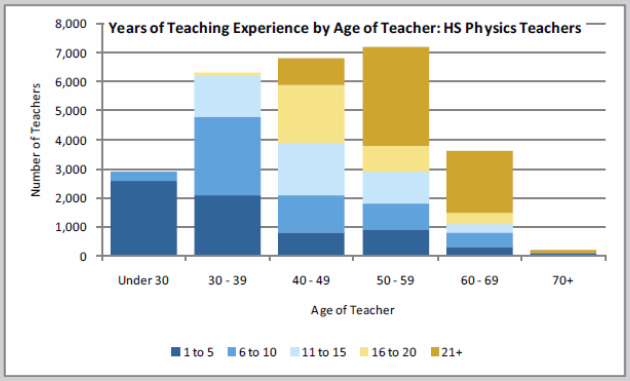
The Aging of the Teaching Corps



In 1987, the median age of high school physics teachers was 41; it rose to 46 in 2001 and has held steady since. The figure shows the age distribution for all teachers in U.S. schools, all high school teachers in both public and private schools, and all high school physics teachers. (The physics teacher data come from our survey; the other data come from the *Condition of Education Digest*, and the most recent data is for the 2007-08 school year. It is unlikely that the age distribution would change dramatically in one year.) It does seem that physics teachers are older, as a whole, than other public high school teachers. Only private high schools have a higher percentage of teachers who are age 55 or older. We must note that about three-fourths of those teaching high school physics plan to teach for at least six more years. (See the March 2012 issue of *The Physics Teacher* for the retirement plans data.)

Next month we'll look at years of teaching experience for the teaching corps. Susan White is Research Manager in the Statistical Research Center at the American Institute of Physics and directs the quadrennial Nationwide Survey of High School Physics Teachers. If you have any questions, contact Susan at swhite@aip.org

Second-career teachers



Last month we saw that the age distribution for high school physics teachers skewed older than that of all teachers. We also noted that, even though they are older, at least three-fourths of the high school physics teachers indicated that they planned to teach high school for at least six more years. The figure shows the age and years of teaching experience for high school physics teachers. We see that almost 12% of the teachers who are 50 years old or older have five years or fewer of teaching experience. Thus, these are likely second-career teachers. The typical age range for second-career teachers is 33 to 59. However, the younger second-career teachers are more difficult to isolate because the average duration of the previous career is one and one-half to three years.

In the December issue, we will look at teaching activities physics teachers use in the classroom. Susan White is Research Manager in the Statistical Research Center at the American Institute of Physics; she directs the Nationwide Survey of High School Physics Teachers. If you have any questions, please contact Susan at swhite@aip.org

Teachers' approaches to teaching physics

Benjamin Franklin said, "Tell me, and I forget. Teach me, and I remember. Involve me, and I learn." He would not be surprised to learn that research in physics pedagogy has consistently shown that the traditional lecture is the least effective teaching method for teaching physics. We asked high school physics teachers which teaching activities they used in their classrooms. While almost all teachers still lecture sometimes, two-thirds use something other than lecture most of the time. The five most often-used activities are shown in the table below.

Activity	% of Teachers reporting this as the most used activity	% of Teachers reporting ever using this activity
Traditional lecture	34	95
Class solves or discusses quantitative or mathematical problems	21	95
Students design / perform experiments / activities	12	88
Students required to work together	10	93
Students use activity-based guided-inquiry curricular materials	10	65

In the January issue, we will look at the 2013 Nationwide Survey of High School Physics teachers. Susan White is Research Manager in the Statistical Research Center at the American Institute of Physics; she directs the Nationwide Survey of High School Physics Teachers. If you have any questions, please contact Susan at swhite@aip.org.

Self-Reported "Best" Resources for Teachers

In over 80% of the schools where physics is taught, there is only one teacher teaching the subject, so most teachers cannot readily turn to a colleague at their schools for answers or suggestions about issues that deal specifically with physics. When physics teachers do have questions about physics content, the most often reported "best" source for answers is the Internet. Potentially demonstrating a better personal network or a better familiarity with the resources available to them, teachers who had completed physics education courses were significantly less likely to use their class texts as the best answer source. Instead, they were more likely to rely on college or university teachers. Having access to resources beyond the class text can help teachers develop a more nuanced understanding of physics concepts, as well as a better sense of perspective about the content they teach.

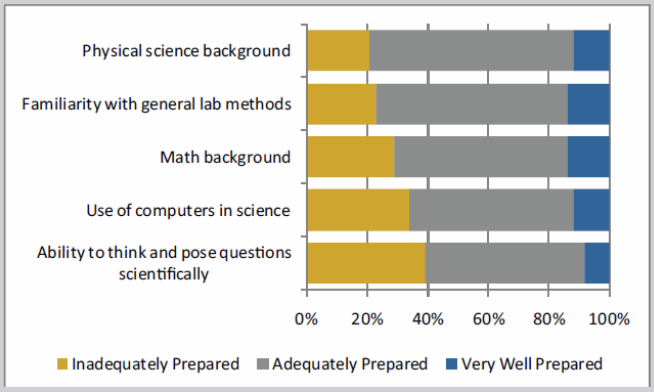
Source	% of Teachers indicating this as "best" source for answers to questions about physics content
Internet	31
Another textbook	22
Class textbooks	18
Another physics teacher	17
Other*	12

*Other includes college professor, research scientist, list-serve, and other resources.

In the March issue, we will look at physics teachers' self-assessed level of preparation in several areas of physics instruction. Susan White is Research Manager in the Statistical Research Center at the American Institute of Physics; she directs the Nationwide Survey of High School Physics Teachers. If you have any questions, please contact Susan at swhite@aip.org.

High School Physics Teachers' Assessment of Student Preparation

Student preparation can be quite nuanced. Not only have students been exposed to a variety of preparatory classes and outside influences, but students also vary in their commitment and approach to their current classes. We asked teachers to offer their opinions on their students' preparation for physics in a number of areas. The overall picture of teacher perception of student preparation in various domains is shown at right. In each of the areas, more than half of the teachers felt that their students were at least adequately prepared. Almost two-fifths of the responding teachers reported that their students were inadequately prepared to think and pose questions scientifically, and less than 10% of the teachers felts that their students were adequately prepared in this area.



In the May issue, we will take a closer look at physics teachers' assessment of students' preparation in math. Susan White is Research Manager in the Statistical Research Center at the American Institute of Physics; she directs the Nationwide Survey of High School Physics Teachers.

If you have any questions, please contact Susan at swhite@aip.org.

WOMEN in PHYSICS and ASTRONOMY

Statistical Research Center (SRC)

Collects, analyzes and disseminates data on education and employment in physics, astronomy and related fields.

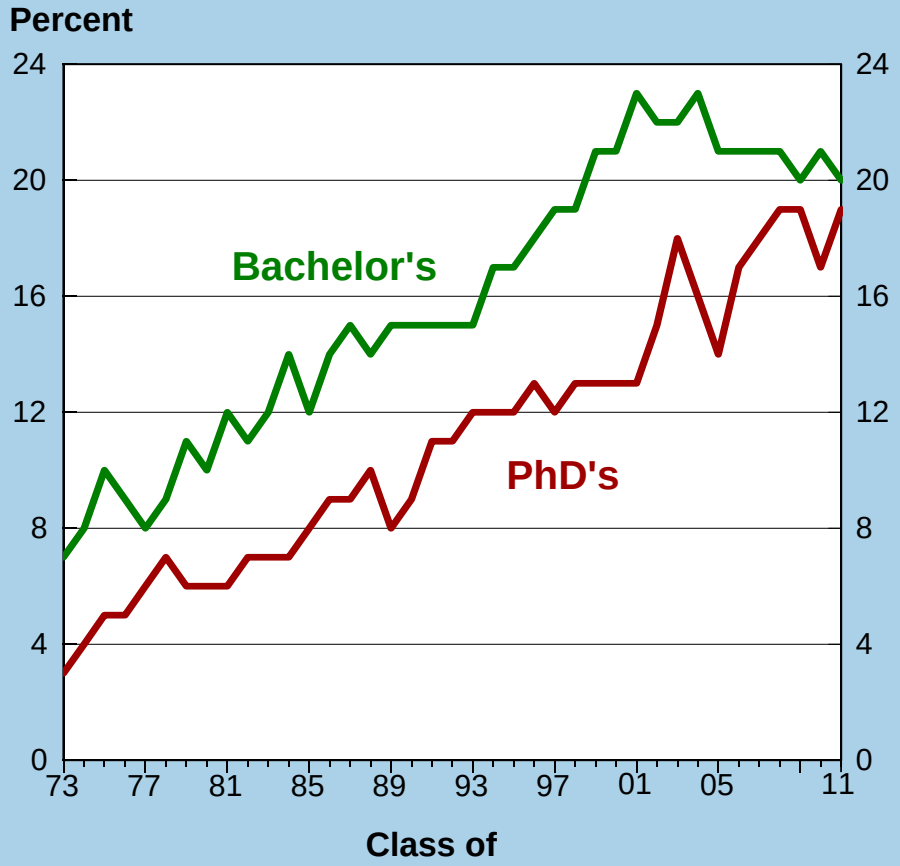
For more data, visit us at:

www.aip.org/statistics

Fourteen percent of physics faculty members are women. This reflects a lower percentage of female PhD recipients in the past.

–2010 Academic Workforce Report

Percent of Physics Bachelor's and PhDs Earned by Women, 1973 to 2011.



AIP Statistical Research Center, Enrollments and Degrees Survey.

FACULTY JOB MARKET in PHYSICS and ASTRONOMY

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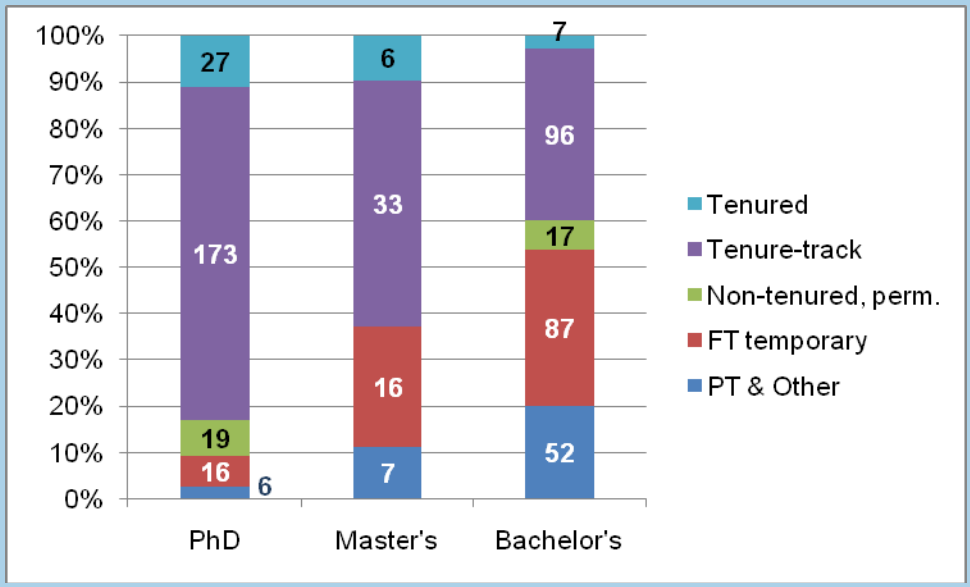
Only 40% of the new hires in bachelor's-granting departments were in a tenured or tenure-track position.

Current Positions of New Faculty Members, 2007-08



The numbers on the graph indicate the number of new faculty members.

Total number of new faculty:
241 in PhD-granting departments
62 in Master's-granting departments
259 in Bachelor's-granting departments

FT – Full-time ◆ PT – Part-time

http://www.aip.org/statistics

SRC Website

The SRC website is now the primary tool for the dissemination of ***focus on***s and data resources.

The look of the SRC web presence has not changed in many years. A redesign is set to go live soon. When we started this process we identified two main goals:

- To make the pages more inviting and visually appealing by adding graphics and a slider to highlight findings and reports.
- To ensure easy navigation, minimizing the number of clicks to find and access specific data.

Traffic Trends

For 2012 we received 95,000 visits to our website from 73,000 unique visitors. There have been a total of 206,000 page views. Below is a list of the top pages.

Page Title	**Pageviews**
Who's Hiring Physics Bachelors	38,400
Statistical Research Center Home Page	34,400
Latest Employment Data for Physicists and Related Scientists	27,500
Current Statistical Research Center Reports	10,600
Career Guidance for High school and Undergraduate Students	7,500
Undergraduate Education	7,100
Employers in California who Recently Hired New Bachelor Recipients	7,100
Graduate Education	4,900
Women in Physics	4,700
High School Physics	4,600
Physics Trends Flyers Download Page	4,600

About half of the visits to our website were sent by a search engine, with an overwhelming majority of these coming from Google. 26% of traffic came from "referrals." These are links to our content located on other sites, including blogs, forums, and links from physics department websites. There are almost 12,000 of these external links. Below is a list of the five sites generating the most visits to our site:

External Site	**Visitors**
PhysicsForums.com	4,200
Huffington Post	3,000
American Physical Society	1,300
Reddit.com	1,300
Physicsgre.com	750

The remaining 22% came directly to our site via our site address.

Content Management

The Institute is working to implement Drupal, a new web content management system. This system will allow for more control over content by authors, and allow for easier updating of content. We have been working to develop a taxonomy to catalog all of the current content, and to label future content. Drupal will use these categories to automatically format and display relevant content to the user.

ASSEMBLY OF SOCIETY OFFICERS
SESSIONS ON DIVERSITY

Roman Czujko

The American Institute of Physics convenes a one-day meeting each year called the Assembly of Society Officers (ASO). This meeting is typically divided into 4 sessions each of which focuses on an issue of concern to the community. As the name of the meeting suggests, the primary audience is comprised of executive directors, the presidential chain and the leadership of the AIP Member Societies and the Affiliated Societies of AIP.

The 2013 Assembly of Society Officers will be convened on Thursday, April 4 and will have two sessions that focus on diversity issues. The word diversity in this context refers primarily to under-represented minorities within physics, astronomy, the geosciences and allied fields. The diversity sessions are being organized by Roman Czujko of the SRC and Liz Dart Caron of the Executive Director's Office. The plans for these sessions have not been finalized. However, the following represents the working draft that describes each session's focus.

Session 1 will focus on raising awareness about under-represented minorities among STEM degrees. Currently, we anticipate a talk that describes the current data and historic trends among undergraduate majors, and degree recipients in the physical sciences. We also anticipate talks from members of the African American and Hispanic American communities about the trends they see and their perspective about reasons for current levels of participation.

Session 2 will focus on working together to maximize our impact. The session will include speakers from federal agencies and corporations about the programs that they direct and that are intended to change the representation of minorities in STEM fields. This session will include a breakout session where society representatives and other participants can discuss ways that they might work together to affect change.

Section 4

Employment Studies

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CAREER PATHWAYS PROJECT

Roman Czujko

Background

The number of physics bachelor's degrees awarded each year in the U.S. has been growing since 1998 and the class of 2011 set an all-time high at about 6,300 bachelor's degrees. As the number of physics bachelor's degrees has increased, the rate at which they were accepted into physics graduate programs in the U.S. has also increased. In short, physics undergraduate education is preparing those students who aspire to advanced degrees in physics.

Many physics bachelor's need or want to enter the workforce after earning their degrees. If physics departments want to continue to grow the number of bachelor's they produce, then the departments will need to prepare students to successfully enter the STEM workplace as well as to prepare students for graduate school.

Career Pathways Project

A joint project of the AIP Education Division and the Statistical Research Center was funded by the National Science Foundation (NSF) on 13 September 2010. It awarded a grant of nearly $200,000 to fund a project entitled, "Expanding the STEM Workforce by Equipping Physics Bachelor's Degree Recipients and their Departments to Address the Full Range of Career Options." The shortened version of the name of this grant is the Career Pathways Project. The award is described at http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1011829.

The Career Pathways Project team is currently comprised of Toni Sauncy and Kendra Redmond of the AIP Education Division and Roman Czujko of the SRC. Our goals include developing a detailed understanding of those physics departments that have a strong record of placing their bachelor's in the STEM workforce. That information will be organized and disseminated so that other physics departments can implement effective strategies to better prepare their degree recipients for the workforce. Thus, the goals include drawing more students into the physics major from all demographic groupings, and to help generate a better, larger, and more diverse STEM workforce.

The Career Pathways Project encompasses three sets of activities: site visits of physics departments, workshops, and alumni board on careers.

Site Visits

Physics departments were selected for site visits based on a strong record in preparing students with bachelor's degrees in physics and placing them immediately into the workforce. The selection criteria used degree and employment data from SRC surveys combined with reviews of the career-related information on each department's web site. Nine departments were selected

from this list to reflect geographic diversity, public and private institutions as well as the range of highest physics degrees awarded. The nine institutions selected were:

Gettysburg College
University of Washington
University of California at Davis
Carthage College
University of Wisconsin at Eau Claire
University of Wisconsin at La Crosse
University of Idaho
Miami University of Ohio
College of Charleston

One of the goals of these site visits was to identify the effective practices in the preparation of physics undergraduates for STEM career pathways and for informing majors about STEM careers. The CPP has completed all 9 site visits and final reports have been written and submitted to the chairs of six of the departments visited. During 2013, a report on the project will be published which will describe the features, characteristics and activities that we found in the departments with a strong record of preparing physics majors for the workforce. This report will also include 2-page summaries of physics department visited.

The type of university, the kinds of undergraduates that normally attend each institution, the strengths of the physics faculty, the resources that each institution has provided the physics department, and the opportunities in the local economy combine to create unique circumstances. Our preliminary analyses of the information we gathered during site visits reveal several features that occur in every physics department we visited and several that may reflect the unique circumstances and opportunities available to a specific department.

Workshops

Workshops are one of the dissemination strategies for this project. The workshops will focus on disseminating accurate information about the STEM careers commonly pursued by physics bachelor's degree recipients, information about effective practices learned from the site visits, and developing plans for how to implement these ideas in the participants' home departments.

The project team will hold 4-5 workshops for faculty and students. The first workshop was convened at the 2012 Physics Congress in Orlando, Florida and workshops are planned for the AAPT summer meeting in 2013 and the March meeting of the APS in 2014. We also plan to hold 2 or 3 workshops at SPS regional meetings during academic year 2013-14.

Alumni Board on Careers

The project team is also establishing a pilot program of Alumni Boards on Careers (ABCs) in 2 physics departments. The careers pursued by the graduates of each department are likely to differ for a variety of reasons including differences in the kinds of jobs available locally. The ABCs will provide an opportunity for alumni to return to their departments so that current students and faculty will have a richer understanding of the unique career profile of their department's graduates. At ABC meetings, the alumni will have an opportunity to describe how their education prepared them for their careers and the aspects of their positions that are intellectually stimulating and professionally challenging. They will also be able to offer suggestions about ways to prepare for different career opportunities. As a result of meeting with alumni, current students should develop an accurate and timely picture of their own career options. In addition, the ABCs will provide current students and faculty members an opportunity to assess the extent to which their physics curriculum is preparing students for the careers they actually pursue.

PHYSICS PhDs 10-15

Garrett Anderson and Roman Czujko

Past Advisory Committees have urged the SRC to explore the early careers of PhD physicists in the United States and they were especially concerned about the lack of reliable data on the careers pursued by physicists in the private sector. SRC staff members developed the Physics PhDs 10-15 Survey to address these concerns. We focused on physics PhDs who had earned their doctorates from U.S. universities 10-15 years prior to the survey and who had remained in the U.S. workforce. Specifically, we targeted 4 physics PhD cohorts: 1) the classes of 1996 and 1997 and 2) the classes of 2000 and 2001, which, combined, totaled about 5,000 PhDs. These 4 cohorts were selected because the first two entered the U.S. workforce at the beginning of the dot com explosion and the last two cohorts entered the workforce after the end of the dot com explosion.

We estimated that we contacted 3,419 PhDs in our target group. This excludes PhDs for whom we never had useable contact information, those who were working outside the US, and respondents who were not the intended person. Verification of 1,860 unique responses to the survey yielded 1,519 legitimate (useable) respondents for a response rate of approximately 44%. Data collection was closed in June 2011.

During the data analyses, it became clear that we had an enormous amount of new data and that we had sufficient detailed information to warrant publishing a series of reports. We decided to focus our attention on the private sector first, since we have comparatively little data on the careers commonly pursued by physicists in the private sector. Our analyses narrowed in on this group and we were thrilled to discover that we had a sufficient number of respondents to reliably describe eight distinct career paths within the private sector:

the self-employed,
those working for government contractors,
those working in finance,
industrially employed physicists working primarily in engineering,
industrially employed physicists working primarily in computer science,
industrially employed physicists working primarily in physics,
industrially employed physicists working primarily in other STEM fields, and
industrially employed physicists working primarily working outside of STEM.

A draft of a report detailing these eight private sector career paths is underway. The report opens with an overview section that includes a demographic profile of respondents as well as salaries, postdoc experience, and qualitative job measures across the eight career paths. Following this are profiles of each of the eight career paths including detailed job descriptions, work activities,

the types of knowledge and skills used regularly, common job titles, and the most rewarding aspects of their work.

We plan to publish the first report around May 1 and will follow up the report on physicists in the private sector with similar reports on careers in academe, government, medicine & healthcare, and non-profit research institutes.

INITIAL EMPLOYMENT SURVEY

Patrick Mulvey, Casey Langer Tesfaye, and Garret Anderson

Each winter the SRC surveys new physics and astronomy bachelor's, master's, and PhD's from the preceding academic year. This is a long running SRC survey, and as such we are able to present the data both as a snapshot of the outcomes for recent degree recipients and as a time series illustrating how the initial employment outcomes for new graduates has changed over time. This degree recipient follow-up survey also provides data on the proportion of bachelor's and master's who choose to continue their education, including fields of study and types of support.

The findings of these surveys are published in a series of ***focus on***s and are a key part of the career guidance web pages for APS, AAPT, as well as for many of the physics and astronomy departments across the country. The data from this survey series is regularly incorporated into the papers and presentations at physics and astronomy professional society meeting sessions dealing with career issues. We strive to present the data clearly and make individual tables and graphics easily accessible.

We frequently hear from department faculty that they utilize this initial employment data to educate parents of prospective undergraduate majors about the variety of career opportunities, many of which are well-paying, for students with undergraduate physics degrees.

A popular resource that stems from the Initial Employment Survey is "Who's Hiring Physics Bachelors". This is a state by state listing of companies that have hired new physics bachelor's into STEM positions. This resource is used by departments to help locate local employers whom they may want to develop relationships with and by students to get an idea of the breadth of employers who hire undergraduate physics majors.

This is an online-only survey which uses a customized questionnaire for each of the three degree levels. The name and contact information used to conduct these surveys are gathered as part of the SRC's Enrollments and Degrees Survey. Because these are population surveys, obtaining comprehensive lists of degree recipients with current contact information is of great importance. Many departments do not maintain an alumni mailing list and subsequently are unable to provide good contact information for their past graduates.

When we are unsuccessful in our attempts to contact the degree recipients directly, we turn to their advisors, both for assistance in contacting their former advisee as well as to provide basic post-degree outcome information if possible.

The following ***focus on***s have recently been published as a result of this set of surveys:

- **Physics Bachelor's One Year Later**
- **Physics Bachelor's Initial Employment**
- **Physics Doctorates One Year Later**
- **Physics Doctorates Initial Employment**

STUDY OF CLIMATE FOR UNDERREPRESENTED FACULTY

Rachel Ivie and Susan White

Last year's advisory committee recommended that we develop a research plan for a study of the climate for underrepresented faculty. This is a broad area to consider.

- Should we focus on peoples' experiences or policies? (Focusing on policies may not necessarily address the underlying issue.)
- Should we examine the path to becoming a faculty member or one's experiences as a faculty member?
- What other topics should we consider?

In addition

- Does underrepresented include women or other groups?
- What would motivate underrepresented faculty members to participate?
    - Simply participating potentially identifies respondents.
    - Our ability to report meaningful findings might be compromised in order to maintain confidentiality of respondents.
- How do we identify the underrepresented minority faculty members?
    - Our faculty surveys are conducted at the departmental level; we do not have a list of faculty members.
- Do we use interviews or questionnaires?
    - Interviews could provide much richer information about experiences.
    - However, interviews are very, very expensive to conduct.
    - Interviewers should match the interviewee on race and sex. We do not have any underrepresented minorities among senior staff to conduct interviews. Therefore, we would incur the additional expenses of hiring and training interviewers.
- Should we include all schools or limit the scope to a smaller group of institutions?

ACADEMIC WORKFORCE

Rachel Ivie, Susan White, and Arnell Ephraim

Every two years since 1986, we have collected data regarding the academic employment of physicists. These surveys have provided the physics community with valuable information on the number of open positions and types of faculty hired by physics departments across the United States. This survey also provides the physics community with data about the numbers of women and minority faculty. Very few other scientific disciplines have these kinds of data.

2012 Survey

We began data collection for the 2012 round in March. By the time we closed the survey, we had received responses from 95% of the departments we contacted. In addition to collecting data on number of faculty, retirements, turnover, and hiring (which we do every year), the 2012 survey collected data on the number of faculty by race and sex (we collect data on this topic every four years). We use both web and paper forms for this survey because some department chairs have indicated that they prefer paper.

2010 Survey

We published ***focus on Number of Physics Faculty Members*** which highlighted data from the 2010 survey in April 2012. We have written a second report, ***focus on Women among Physics & Astronomy Faculty***, and it is currently undergoing internal review. We did not publish other reports from the 2010 survey because the faculty turnover data were not consistent with what we had seen in past years. While we understood that economic conditions could have dramatically affected physics faculty turnover, we wanted to wait for the 2012 data to better understand the dynamics.

Reports from the 2012 Survey

The first report from the 2012 Survey, ***focus on Number of Physics Faculty Members*** is currently undergoing internal review. We find that, since 2000, there are fewer physics departments, but more faculty members.

- Between 2000 and 2012, the total number of degree-granting departments fell to 746 (-3%), while the number of FTE faculty members grew to 9,350 (+12%).
- At the PhD-granting level, the number of departments grew by about 3% between 2000 and 2012 (from 186 to 192). Over this same time, the number of FTE faculty members grew faster, increasing from 5,000 in 2000 to 5,620 in 2012 (+12%).
- Even though the number of bachelor's-granting departments fell by about 4% (from 513 in 2000 to 493 in 2012), the number of FTE faculty members in these departments grew by almost 13% (from 2,600 to 2,930).

The data are presented in the table on the next page.

Total Full-Time Equivalent (FTE) Faculty Members in Physics Departments

Highest Degree Awarded	Year	
	2000	2012
PhD	5,000 (186)	5,620 (192)
Master's	775 (67)	800 (61)
Bachelor's	2,600 (513)	2,930 (493)
TOTAL	**8,200 (766)**	**9,350 (746)**

(Number of departments in parentheses)

The year in the table refers to the spring semester. For example, 2000 represents the 1999-2000 academic year.

http://www.aip.org/statistics

PhD+5 SURVEY AND THE EFFECTS OF THE 2008-09 RECESSION

Mark McFarling

The recession that began in December 2007 and ended in June 2009 has had lasting impacts on the economy and specifically employment. We would like to be able to ascertain the impact of the recession on the early careers of PhD physicists. Starting with the class of 2006, we are updating contact information of PhD recipients for a potential survey in the future.

From our experiences with the PhD+10 survey, we know that finding individuals many years after earning their degrees can be an extremely daunting and time consuming task. To help ease this process, we are making efforts to remain in more frequent contact with individuals to keep address information as current as possible.

We first collect addresses from departments while students are pursuing their degrees. Another update from departments occurs when students get their degrees. These addresses are used for the Initial Employment Survey. We encourage respondents to update their addresses as part of completing this survey.

We are now attempting to remain in contact with these individuals at least every other year. In the summer of 2011, we completed an address update survey to 5072 PhDs (classes 2006-09), which yielded 1404 updated contacts (28%).

We recently sent 7615 addresses from the 2006-2011 PhD classes to an address update service. This service provides postal change of address information for mailing lists. They returned new addresses for 1356 (18%).

This summer, we plan to do another address update survey to all selected classes.

Section 5

Strategic Planning

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STRATEGIC PLAN

Roman Czujko and Rachel Ivie

The Statistical Research Center is one of nine divisions in the Physics Resources Center (PRC). In late 2011, the entire PRC began work on a strategic plan. We have included the latest version of this plan. It includes descriptions of our mission, vision, purpose, and values, as well as the key activities and programs of the PRC and its divisions. As you will see, PRC divisions engage in a remarkably wide array of activities.

Strategic Plan and SWOT Analysis

In order to help you navigate through this document, we have highlighted in yellow those parts that specifically mention the Statistical Research Center. Strategic plans typically include an analysis of strengths, weaknesses, opportunities and threats (SWOT). The document includes the SWOT analysis for the PRC and the SRC. To minimize the volume of information, we have deleted the SWOT analyses for the other eight divisions.

Primary Audiences

During the SRC Advisory Committee meeting in 2012, we had a very useful and productive discussion about the SRC description of the audiences that we serve. As a result of comments that several committee members made, we rethought and rewrote this document. The latest version (two pages long) is included and it describes our current conceptualization of our audiences, the unique activities that we perform on their behalf, and a listing of the metrics that can be used to measure the extent to which we are succeeding in meeting the needs of our audiences.

SRC Implementation Plan

We have included a one-page document that outlines a three-year implementation plan for the SRC. This plan includes how we intend to broaden the dissemination of our research findings (see the strategic plan) and identifies metrics we will use (see the audiences document) while also pulling in several recommendations from last year's Advisory Committee Report.

Topics for Discussion at this Meeting

We would value any comments that Advisory Committee members have about the direction and the content of the SRC's part of the strategic plan.

We believe that the attached documents should help us develop a research plan for the SRC over the next few years. The SWOT analysis shows that the data needs of the community are extensive. However, the resources available to the SRC (especially staff time) are limited. We believe that it would useful to discuss the issues of contemporary concern facing the community and to discuss how the SRC might spend its resources on the data questions that would most benefit our primary audiences.

The AIP Physics Resources Center Strategic Plan (2012-2015)
Draft: 12 Dec 2012

From the AIP Corporate Strategic Plan:

Vision

AIP: a leading global physical science communications and outreach organization to benefit scientists, students, and the general public.

Purpose

Promote physical science and its value to humanity.

Values

- Appreciation and passion for physical science research, education, and heritage
- Collaboration and trust
- High-performance and innovation
- Integrity, accountability and transparency
- Stakeholder/customer-focused

Critical Issues

Four "critical issues" are identified in the AIP Corporate Plan. The Physics Resources Center (PRC) strategic planning effort focused on numbers 3 and 4 (in bold):

1. Effective governance
2. Effective publishing (healthy and sustainable publishing)
3. **Value to Member Societies (MS) and other stakeholders**
4. **Effective business model and organizational excellence**

PRC mission:

Advance physics and allied fields by providing information, initiatives, and specialized programs, products, and services of superior quality to Member Societies, their individual members, students, and the general public.

The PRC mission is carried out by nine divisions:

- Magazines and Physics Today Career Network (PTCN)
- Center for History of Physics (CHP)
- Niels Bohr Library and Archives (NBL&A)
- Statistical Research Center (SRC)
- Education (includes the Society of Physics Students, Sigma Pi Sigma and GradschoolShopper.com)
- News and Media Services (NMS: includes *Inside Science* News Products and Media Services)
- Government Relations (GR)
- Industrial Outreach (IO)
- Development

Current Programs

For many years, AIP has established outreach and community-support programs that provide critical products and services to scientists, students, historians, policy professionals, and the general public. The PRC supports the physical science community with programs that AIP is uniquely able to perform or that are too large or specialized for any one scientific society to support. These programs also directly benefit the AIP Member Societies. In 2011 the PRC surveyed Member Society stakeholders about the value of PRC programs and services. This feedback has been incorporated into PRC strategic planning efforts.

Currently, PRC provides an array of products and services to the science community. *Physics Today (PT)* is the most visible product that reaches every member of our Member Societies. In addition, each month, *Physics Today Online* (*PTOL*) reaches more than 50,000 non-members, providing a potential audience for Member Society recruitment. Other PRC activities include providing media services and newsrooms to promote Member Society meetings, and producing a news service and TV program to bring science news directly to the public. On behalf of the AIP Member Societies, AIP supports a Congressional and State Department Fellowship program and provides support to Member Societies' government relations programs and policy-advocacy activities. This support also includes the highly regarded *FYI* policy-news product. The *Center for History of Physics* and the *Niels Bohr Library and Archive* inform the collective memory of physics and allied sciences, and are expanding efforts to tell the stories of physics in ways that strengthen education and encourage fuller engagement between the public and physicists. AIP Development efforts are expanding to provide information on estate planning and to match prospective donors to the PRC programs, in a manner that does not compete for support to MS. The Education Division gives undergraduates in physics and astronomy their first scientific society experience, and encourages students to join a Member Society. This division also provides a broad view of careers and research within the physical sciences. The Society of Physics Students (SPS) also sends student reporters to Member Society meetings and publishes their articles in newsletters. More than half of the Member Societies partner with SPS to host summer interns and/or to bring student events to their meetings. In addition to their often-cited reports on enrollments and degrees, physics in high schools, and initial employment, the Statistical Research Center has partnered with seven of the Member Societies to study issues of specific concern to their members. The Industrial Physics Forum, hosted by Member Societies and AIP Corporate Associates, has brought industrial physics content and speakers to six Member Society meetings since 2006.

Primary and Secondary Constituents of PRC Programs and Services

The scientific scope of PRC programs is quite broad, covering many aspects of the physical sciences represented by the scientific expertise of our Member Societies, and in some PRC programs, science in general. The primary audiences for PRC programs are the Member Societies and their membership. PRC depends upon the network of scientists and students who make up the physical science community, as well as on the MS leadership for support. The MS leadership includes members of the AIP Governing Board, MS senior staff, as well as more than 100 volunteers who serve each year on PRC advisory and award selection committees.

Some of the programs have evolved to branch out and serve the full breadth of physical sciences,. For example, during the past 15 years, *Physics Today* has broadened the topics covered in news and feature articles. AIP also has accessioned historical records from all MS into the Archives, and we now provide media services to support and enhance the MS outreach efforts. AIP will continue to serve and partner with this primary audience to promote and

improve the value of PRC programs through marketing, organized events at MS, and face-to-face meetings with society leaders.

Another very important primary audience is the physics and physical sciences departments that use PRC information and services. This group includes department administrators, professors and student mentors. Traditionally this audience was primarily in the United States, but now is becoming increasingly international, through new non-US SPS chapters, a growing international interest in the GradSchoolShopper (GSS) and SRC reports, and the global popularity of History Programs.

PRC's other audiences include: [see Appendix 2 for the glossary of acronyms]

- the general public (NMS, PTOL, online history collections);
- undergraduate physics students and their parents (SPS, Sigma Pi Sigma, GSS, PTCN, SRC);
- science policy makers (*FYI*, policy fellows, SRC);
- educators, (GR, SPS, Inside Science, PTOL, SRC);
- journalists and news directors (NMS, PT, GR, SRC);
- Industrial physicists and technical personnel (PT, PTOL, Corporate Associates, SRC);
- historians of science and scientists interested in history and photo researchers (CHP/NBL&A);
- corporate advertisers (PT, AIP journals, development opportunities);
- donors, family foundations, and government funding agencies (Development, SPS, CHP/NBL&A); and
- the international physics community (SPS, GSS, PT, PTOL, History Programs, SRC).

Unique Aspects of AIP Programs

PRC programs reflect the umbrella mission of AIP. They serve AIP's constituencies by providing programs and services that augment and support the work of the Member Societies. AIP listens to the needs of our small and large societies, providing them services as needed. For example, for smaller societies, AIP provides media, government relations, job boards; for larger societies, AIP provides news products and industrial outreach, as well as partnering on media and government relations efforts. All societies also benefit from surveys, and SPS and PT as unifying programs. AIP provides timely, accurate data (SRC) and reporting on news and events important in the physical sciences. Working with Member Societies, AIP is an incubator of innovative initiatives and ideas. For example, AIP in a partnership with AAAS and ACS was among the first scientific societies (in the 1960s) to be awarded an NSF grant to support the communication of AIP and Member Society journal results to the general public. AIP also introduced *Physics Success Stories* in the 1990s, which were government relations tools that highlighted the societal and economic benefits of federally funded physical-sciences research.

No other organization provides a home for undergraduate physics students or comprehensive information on education and employment in the physical sciences. None of the MS have professional archivists and historians to insure the preservation and access to their historically valuable records.

AIP is strong in communicating to niche constituencies through a variety of publications, including *Physics Today, Radiations, The SPS Observer*, *Inside Science,* the *History Center*

Newsletter, and many print and electronic project reports. AIP also provides excellent services and products to Member Societies at very low rates. AIP provides opportunities for the societies to further fulfill their own missions by participating in its programs. AIP's Corporate Associates program serves industrial scientists, across many areas of physical sciences. Policy programs serve the broader science policy community in DC and around the United States. No other U.S. physical science organization supplements science news coverage through so many outlets around the United States.

Strategic priorities

To better serve the MS and other stakeholders, AIP will evolve and strengthen PRC products, programs, and services through innovative initiatives and synergistic collaborations. The AIP Physics Resources Center will seek financial sustainability by enhancing the cost-effectiveness of our programs. The three PRC 2012-2015 strategic priorities are listed below. Underneath each we list the specific goals and then the tactics that will be employed and metrics that will help determine our success in reaching the goals.

Connect and Broaden the Community that We Serve

Increase online readership of PTOL

Add two new departments or areas of original content

Increase the number of monthly visitors and registered users

Create an active center for scholars in the History Center

Hold two public history events per year

Increase postdocs and visiting researchers to 6-10 per year.

Increase dissemination of findings from core SRC surveys (HS Physics, Enrollments and Degrees, Initial Employment, Academic Workforce)

Increase department website links back to SRC

Substantially increase subscribers to the SRC data alert service, e-Updates

Increase membership in SPS as the number of BS in physics increases

Key link to MS membership, increase activities at MS meetings

Expand efforts throughout PRC to reach under-represented groups in physics

Evaluate the impact of and possibly expand the Future Faces of Physics program

Continue to measure women and underrepresented minority involvement through SRC studies in the physical sciences.

Develop oral history projects on women and African Americans in physics

Develop LCURM activities to build collaborations between Member Societies

Advocate for public policy issues that affect AIP and the Member Societies

Support existing and new MS government relations activities

Create a Governing Board level advisory committee on public policy to identify actionable issues for AIP

Innovative Initiatives

Enrich NBL&A collections by obtaining new oral histories and expanding on-line resources

Hold training seminars at MS meetings to teach others how to collect histories

Secure external funding to digitize additional collections

Publish and disseminate broadly the results of the History of Physics Entrepreneurship study

Report out by 3Q, 2013

Conduct statistical research to respond to issues of contemporary concern
Secure funding and launch two surveys: attrition from undergraduate physics programs; and the effects of 2008 recession on physics doctoral students

Reinvent *Journal of Undergraduate Research in Physics* as the premiere journal for undergraduate physics students and their mentors
Double the number of submissions, reviews, and published papers

Expand resources for students on career trajectories for those with physics bachelor's degrees
Complete in 2013, and disseminate the results of the career pathways grant broadly

Use the IPF at ICTP to explore and expand international focus of AIP Industrial Outreach
Follow-up surveys of participants, secure new funding

Reach underserved parts of the public with science news programming
Build a syndicated network of at least 20 local TV news stations for Inside Science TV
Increase production and news outlet pick-up of Inside Science News Service articles

Establish priorities and impact policy through the Physical Sciences Education Coalition
Establish a formal coalition working-group of at least 5 MS
Identify a policy agenda of 3-5 items for which the group can advocate

Expand use of video-based media services as part of our media support for MS
Evaluate pricing structure to cover costs and sell to 3 societies

Expand GradschoolShopper (GSS) to improve its value to the community
Expand oversees sales by 10% per year
Capture every US physics graduate program as a GSS customer
Expand GSS into more physics-aligned fields, increasing programs listed by 10%

Assuring Financial Sustainability

Increase reach of PT Career Network
Job ads increase 3-5% in 3 years, one new society Job Board partner

Improve the sustainability of PT
Increase multimedia advertising and classified ad revenue by 3%
Control expenses to enable new investments

Increase joint History Programs endowment by $5M
Cultivate more high-value donors, increase size and number of gifts, without impacting support for MS

Increase contributions for student programs by 10%
Cultivate individuals and corporate sponsors
Cultivate SPS members after graduation through alumni networks.

Expand online advertising
Grow ad revenues on web and social media sites (History, IS)
Sell 3% more online ads for PTOL

Develop marketing capabilities and integrate marketing into product planning
Launch more aggressive marketing campaigns for GSS, IS, SRC, History Programs

Increase PRC endowment by $1M through planned giving and major gifts
Develop a plan for stewardship of the endowment funds
Engage more volunteers with access to influence and affluence in fundraising
Expand the use of technology for fundraising

Stabilize funding for a second Congressional Science Fellow
Partner with a Member or Affiliate Society

Update pricing structure for research services (SRC)
Release new prices in 2013

Appendix 1: **SWOT Analysis**

Below is an analysis of strengths and weaknesses (internal factors) and opportunities and threats (external factors). This analysis is presented in two parts: a general SWOT, representing issues that all PRC Divisions face, and then specific Division-centric SWOT analysis. Each Division SWOT is followed by a list of Critical Issues identified through the analysis, and tied to Corporate Plan.

SWOT Analysis for PRC Strategic Planning

1. PRC overall

1.1. Strengths

- 1.1.1. Unique programs among MS and other organizations (SRC, PT, IPF, SPS, NMS products, PTCN) , recognized as an information provider (FYI, SRC, History reports, PT, News, etc)
- 1.1.2. Staff expertise in many areas of outreach, across all divisions, dynamic leadership, excellent leveraging of resources
- 1.1.3. Strong advisory committee structure for each division
- 1.1.4. Audience reach is wider than MS members (undergraduate physics majors, historians, journalists, amateur astronomers, university administrators, 50% of PTOL readers, hidden physicists among the ranks of Sigma Pi Sigma members)
- 1.1.5. AIP HR policies encourage employees retention (tuition reimbursement, training, day care, etc.)

1.2. Weaknesses

- 1.2.1. Lack of formal PRC-wide program evaluation and strategic planning
- 1.2.2. Need for better communication and partnerships with Member Societies
- 1.2.3. Lack of marketing expertise or a strategic marketing plan

1.3. Opportunities

- 1.3.1. Public appreciation for science and technology is still strong
- 1.3.2. Social networking
- 1.3.3. More collaboration with Member Societies
- 1.3.4. Increased collaboration with teachers to provide them information and tools.
- 1.3.5. New projects possible through grant funding (Foundations, federal agencies) and increasing our donor base

1.4. Threats

- 1.4.1. AIP budget situation could limit PRC programs, largely dependent on publishing surplus
- 1.4.2. Other organizations provide some similar programs
- 1.4.3. Threats to funding science in the US budget, affects agency programs and research opportunities for the community
- 1.4.4. Physics departments are losing degree granting status, especially at HBCUs & other MSIs

PRC Critical Issues

1. How can PRC Development work closely with Divisions to identify funding sources to make outreach programs more secure (diversify revenue streams)?
2. Should PRC continue to emphasize the variety of brands that are known in the community, or begin to emphasize that they are part of a larger group of outreach programs (AIP-PRC)?
3. How can the divisions ensure more open communication with Member Societies about outreach programs?

5 STATISTICAL RESEARCH CENTER

Mission: To document and report on the trends in the comprehensive issues of education and employment of physicists and related scientists; to provide SRC survey research expertise as a service to other AIP units, AIP Member Societies, and related scientific organizations to assist them in addressing the information needs of their constituents and customers.

5.1. Strengths

- 5.1.1. Vast amount of historical data allows us to provide context for current events
- 5.1.2. A collaborative relationship of long standing with the community of data collectors representing other disciplines
- 5.1.3. Continuity of data collection over time allows for in-depth analysis and interpretation of trends
- 5.1.4. Ability to focus on issues of specific concern to the physics and astronomy communities
- 5.1.5. On-line reports can be disseminate more quickly and are less expensive to produce than printed reports

5.2. Weaknesses

- 5.2.1. We do not have a solid relationship with several of AIP's Member Societies
- 5.2.2. Our data collection has focused almost exclusively on physicists, astronomers and geoscientists.
- 5.2.3. We have excellent data on academia, but our coverage of the private and government sectors could be stronger
- 5.2.4. Too many members of the physics community are unaware of our existence or of the data resources we can provide

5.3. Opportunities

- 5.3.1. Develop a deeper understanding of the skills that physicists have, the careers that they pursue and their positive impact on the knowledge base, the economy, and the quality of life.
- 5.3.2. Address emerging concerns including a better understanding of attrition and retention across all stages of the physics and astronomy education system.
- 5.3.3. Understand the causes of and effective practices to ameliorate the low participation rates of women and minorities in physics and related fields.
- 5.3.4. Heightened interest in the industrial employment of physicists, physics at 2-year colleges and the global physics community
- 5.3.5. Partnerships across disciplines to build on our strengths and coordinate our efforts.
- 5.3.6. Increase marketing of SRC resources to reach new audiences, especially through on-line reports

5.4. Threats

- 5.4.1. Physics employment is elastic in that physicists work across all employment settings and in a variety of disciplines. However, physics is a comparatively small discipline and the job market is fragile for physicists working either in physics or in related fields.
- 5.4.2. The physics job market is influenced by social and economic forces beyond anyone's control or foresight, making generalizations about the future difficult if not impossible.

5.4.3. The image of what physics is and what physicists do is more limited than it should be in the minds of students and their parents, faculty members, potential employers, funding agencies, and the general public.

5.4.4. Potential survey respondents (especially in the U.S.) are overwhelmed by survey requests, many of which come from incompetent groups or groups that are trying to sell a product under the guise of doing survey research.

5.4.5. Do-It-Yourself survey services are available for lower charges than we can afford to compete against.

5.4.6. Competition from academic research institutes that conduct surveys under contract but are able to use free or low-cost graduate students to conduct the work.

Critical Issues

1. How can SRC disseminate research findings to new audiences while continuing to address the data needs of their traditional constituencies?
2. How can SRC balance its research portfolio between cores studies and research services to Member Societies and the larger scientific community?
3. How can SRC develop support for incubator studies, especially those that take several years to complete)?

Primary Audiences, Unique Activities and Measures of Success
Statistical Research Center
Apr. 25, 2012

OVERVIEW

This document answers three questions: who are the primary audiences of the SRC, what unique activities does the SRC do for these audiences, and how do we measure success?

As reflected in our Mission Statement, we have several different audiences. As a result of extensive discussion during our recent Advisory Committee meeting, we have redefined our audiences.

A TWO-PART MISSION

- to document and report on the trends in the comprehensive issues of education and employment of physicists and related scientists

These data are used by members of community to assess the vitality and health of their discipline. Our program is essential because no other group can provide the timeliness, level of detail, and accuracy that are the hallmarks of our research findings. There are other national groups that collect data about the education system, but they are not able to devote much effort to physics because it is comparatively small, i.e. less than 1/2 of 1% of all bachelor's degrees are awarded in physics and only 3.3% of all PhDs are awarded in physics. Astronomy is an order of magnitude smaller still. Because degree recipients in physics commonly pursue a broad array of career paths, no other group is able to provide useful, accurate or timely data on what physicists or astronomers do in the workforce.

- to provide research services to other AIP units, AIP Member Societies, and the scientific community

We provide survey, statistical and questionnaire review services to AIP units & Member Societies. We conduct surveys that address the specific needs of the constituents of the scientific groups for whom we conduct surveys.

UNIQUE ASPECTS OF SRC ACTIVITES

- The SRC is the only group that provides timely, accurate and detailed data and education and employment at the level of physics and astronomy.
- The SRC has a very high level of technical expertise and a strong track record in composing questions that physicists, astronomers, other scientists can answer.
- The SRC has high professional standards:
    - We follow research-based principles of questionnaire design.
    - We rigorously protect privacy and confidentiality of respondents.
    - Our senior staff members are IRB certified.
    - The SRC uses survey methodology that adheres to the standards of the profession.
    - We objectively interpret research findings.

AUDIENCES & CONSTITUENTS

We have defined our audiences as groups we have in mind when planning and conducting research.

1. Academia in the U.S., including
    a. Professors at physics and astronomy degree-granting departments,
    b. Physics and astronomy faculty members at 2-year colleges,
    c. Physics and astronomy undergraduates and graduate students
    d. College and university administrators
    e. High school physics teachers
    f. High school principals
2. Other AIP units
3. AIP Member Society staff and committee members
4. Individual physicists, astronomers, and scientists in related fields in the U.S.
5. Global physics community

Ancillary audiences (these groups use our data after we have collected them with our primary audiences in mind). We often serve these audiences when we collaborate with other AIP units or AIP Member Societies.

1. Other STEM professional societies
2. Employers of physicists, astronomers and related scientists in the U.S.
3. Journalists
4. Science policy makers in the U.S.
5. Funding agencies in the U.S.
6. High school physics students and their parents in the U.S.

MEASURES OF SUCCESS

Dissemination

Direct

Number of invited talks given by SRC staff members over the last 12 months
Number of invited talks given at international conferences over the last 3 years
Number of subscribers to *eUpdates*, the SRC data alert services
Number of website hits during the days immediately after an *eUpdate* is sent out
Number of *focus on's*, reports, and articles published
Physics or astronomy departments that post *Physics Trends* flyers

Indirect

Number of physics or astronomy department websites with links to the SRC website
Number of links from other websites to the SRC website
Number of citations of SRC data by journalists
Talks at meetings that use data from the SRC

Collaboration

Number of research collaborations with other AIP units over last two years
Number of Member Societies for whom we conducted a survey over last two years
Number of groups that use our Questionnaire Review Service over last two years
Number of surveys conducted in collaboration with external groups (excluding M.S.)

Other

Amount of revenue generated by contract surveys
Response rates (resp. rates serve as strong indicators of relevance & value)

Implementation Plan for SRC Priorities in Strategic Plan

Strategic Priority: Connect and Broaden the Community that We Serve
Goal: Increase dissemination of findings from core SRC surveys

Increase department website links back to SRC

- Year 1: contact physics department chairs and SPS Advisors to encourage them to provide hard links between their department websites and the SRC website with the target of increasing the number of links from 220 to 320
- Year 3: contact chairs of those departments that still do not have links with SRS with the target of adding another 50 departmental links to the SRC website

Substantially increase subscribers to the SRC data alert service, *eUpdates*

- Year 1: contact individuals who have responded to the Initial Employment Survey and other selected core surveys informing them about the opportunity to subscribe with the goal increasing from 1,400 to 1,800 total subscribers
- Year 2: place ads about the *eUpdates* data alert service on the last page of selected reports in the *focus on* series with the goal of adding another 400 subscribers
- Year 3: contact individuals who have attended the last two Department Chairs Conferences and the last two New Faculty Workshops informing them about the *eUpdates* data alert service with the goal of adding 200 more subscribers

Strategic Priority: Innovation Initiatives
Goal: Conduct research to respond to issues of contemporary concern

Secure funding and launch two surveys: attrition from undergraduate physics programs; and the effects of 2008 recession on physics doctorates

Attrition

- Year 1: Meet with collaborators and advisory committee. Identify partners. Submit a two page summary to funding agency.
- Year 2: Write and submit grant proposal.
- Year 3: Based on feedback from grant proposal, resubmit or begin survey.

Effects of 2008 recession

- Year 1: Update addresses for physics doctorates from years 2006-2010. Visit funding agency program officers to solicit funding advice.
- Year 2: Continue address updates. Prepare and submit proposal if advised to do so by funding agency.
- Year 3: Based on feedback from grant proposal, resubmit or begin survey.

Strategic Priority: Assuring Financial Stability
Goal: Update pricing structure for SRC research services

Release new prices in 2013

- Year 1: Update the hourly fee that should be charged for research services in order to recover full costs

Section 6

Collaborations

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THE GLOBAL SURVEY OF PHYSICISTS

Casey Langer Tesfaye, Rachel Ivie, Raymond Chu, and Roman Czujko

Background

The SRC conducted three international surveys in conjunction with the conferences of the International Union of Pure and Applied Physics (IUPAP) Working Group on Women in Physics. The purpose of the international surveys has been to provide the international physics community with data about the situation of women in physics worldwide. This survey differs from past global surveys in a few important ways:

- Past surveys were limited to women, but the current survey includes both sexes, allowing for comparisons between women and men.
- Past surveys were only available in English, but, thanks to a grant from the Luce Foundation, the current survey was available in eight languages (English, Spanish, French, Russian, Japanese, Chinese, Arabic and German).
- Past surveys involved our international partners only on the distribution level, but the current survey involved them in the survey design and translation phases as well.
- For the first time, the survey was sent to statistical samples of two physical societies: the German (DPG) and the American (APS).

Countries that did not or were not able to use their physical societies for distribution were still included, because invitations were circulated by IUPAP team leaders. Additionally, respondents were directly asked to pass the survey along to their colleagues. In fact, we heard from physicists in a number of countries where there was no IUPAP team leader to distribute the survey.

Although it is closed to responses, the survey can still be viewed here: http://www.aipsurveys.org/global

After thirteen months of data collection, the 2009 Global Survey of Physicists officially closed to responses in late November 2010. Thanks to the help and enthusiasm of the countless people who helped design, review, translate and distribute the survey, we were able to collect responses from about 15,000 physicists, representing over 130 countries.

Dissemination of Quantitative Results

The first presentation of the data was at the fourth IUPAP International Conference on Women in Physics in Stellenbosch, South Africa in April 2011. Since then, we have made five additional presentations about the global survey to various audiences.

An article based on the gender differences in the data, entitled 'Women in Physics, a Tale of Limits' was published in *Physics Today* in February, 2012 (http://www.physicstoday.org/resource/1/phtoad/v65/i2/p47_s1). In this article, as in the verbal presentations, we examine sex differences in the availability of professional resources and

opportunities in both very highly developed and less highly developed countries. Although the low proportion of women in physics has been recognized and discussed, sex differences in career-advancing factors, such as access to resources and opportunities, have not been explored in great detail. This article explores those differences.

Open-Ended Responses

We collected far more open-ended responses than we had anticipated, and many respondents offered thoughtful and insightful comments. We asked respondents to elaborate about their school experiences and careers, to comment on reasons that they have felt discouraged about physics, and to provide insight about the situation of physicists in their country. We have learned, for example, that the situation of physicists in many countries is quite vulnerable to political influences.

Unfortunately, the translation of these responses into English for analysis is a costly endeavor, which is further complicated by confidentiality issues. We received partial NSF grant funding for the translation and analysis of the open ended responses to the survey, and we are focusing our ongoing qualitative coding and analysis on a statistical sample of the responses to two questions:

- Is there anything else you would like to tell us about your university experience?
- Please comment on reasons you felt discouraged [about physics].

The responses to these questions are informative and wide-ranging, and they represent a solid distribution of countries and languages. Coding of these responses will be completed soon. In order to complete translation and analysis of all open-ended questions, we will need to secure additional grant funding. However, in published reports, we will include our analysis of the qualitative data that we have been able to translate so far, whether or not we secure additional funds for translation.

Reports to Individual Physical Societies

Because the American and German physical societies sent the survey link to statistical samples of their memberships, we prepared special reports for them.

- We sent a report on the DPG responses to the German working group in October of 2010 and their full dataset in January 2012, in keeping with our original agreement.
- From the sample of over 13,000 APS members, a total of 2,171 members in the U.S. and 3,482 members abroad responded. The final report to APS summarizes the responses from the U.S. members only and was completed in March of 2011.

LONGITUDINAL STUDY OF ASTRONOMY GRADUATE STUDENTS

Rachel Ivie, Arnell Ephraim, and Raymond Chu

Background and Purpose

A resolution was adopted by the 2003 Women in Astronomy conference to conduct a longitudinal study of women in astronomy using sound statistical techniques. As a result, the AAS (American Astronomical Society) council and AIP provided funding for the first phase of the Longitudinal Study of Astronomy Graduate Students.

The study is designed to track the career and educational experiences of graduate students in astronomy or astrophysics. We contacted all known graduate students in these fields during the 2006-07 academic year. The same individuals whom we first contacted will be contacted for the duration of the study. The study was originally designed to measure *sex differences in attrition* from astronomy, but the purposes have expanded to include:

- Trends in employment over 10+ years for a single cohort
- Why people decide on particular career paths: academia, private sector, public sector, research, etc.
- When and why people decide to change career paths.

First Survey

The framework for the first phase of the study was guided by several hypotheses, which were developed by the SRC and by an AAS working group on this project. The main hypothesis was that feeling like an imposter in the field is more likely for female astronomy graduate students than for male. The imposter syndrome is a psychological construct defined as believing that one does not really belong in a field because of lack of true ability. We further hypothesized that exhibiting characteristics of the imposter syndrome will be related to attrition from the field. We will be able to test the latter hypothesis after subsequent surveys in the study. From the first study, we found that:

- **Mentoring matters.** Students who reported feeling mentored were more likely than others to demonstrate confidence in their ability to become good researchers. They also were less likely to demonstrate characteristics of the imposter syndrome

- **Who's being mentored?** The odds of feeling mentored decreased with each additional year spent in a program. More research needs to be done to understand why this effect exists.

- **Women and men see things differently.** Female astronomy graduate students were more likely than males to report that the climate in their environment was not welcoming. Women were more likely than men to show characteristics consistent with the imposter syndrome.

AAS Working Group and Demographics Committee

Initially, the SRC collaborated with a working group from AAS composed mainly of former members of the CSWA (Committee for the Status of Women in Astronomy). As the CSWA members rotated off the committee, the original members of the working group continued to be affiliated with the project. In 2012, the working group officially became part of the Demographics Committee of the AAS.

Second Survey

During 2012, the SRC and the Demographics Committee developed the second questionnaire for this study. The survey, which we first sent to respondents in September, asks about career and educational experiences, including experiences of postdocs. The questionnaire includes modules for those who are still in school and for those who left with a master's, with a PhD, or with no graduate degree.

The second survey currently has a response rate of 51%, and we are continuing to collect data. In order to find respondents who may have left astronomy or are not members of the AAS, we will soon be sending a paper mailing to non-respondents.

We are pursuing several funding sources for further surveys in the study, including funding from AAS and an unsolicited proposal to the NSF Astronomy directorate.

AAPT PEER MENTORING PROPOSAL TO NSF

Rachel Ivie

I recently worked with an AAPT (American Association of Physics Teachers) committee that submitted a proposal to NSF's ADVANCE program in November. The project is designed to set up and evaluate the effectiveness of peer mentoring for isolated women in physics. Peer, or mutual, mentoring is a system where people at a similar career stage meet to exchange ideas and support one another's career advancement and development.

The idea for this proposal came from a group of senior women physicists who set up a mutual mentoring system for themselves. Most of this mentoring occurred via web or e-mail, reducing the need to travel. This proposal aims to expand these virtual mentoring groups to other isolated women physicists:

> "This project will create mutual mentoring eAlliances for professional development under the auspices of the American Association of Physics Teachers (AAPT) by developing ten alliances of five participants each among women physics faculty who are isolated in various ways—because they are minorities, because they are the only single mother in their department, because they are in one person departments, etc." (*from the proposal*)

If the proposal is funded, I will work with the project PI, Co-PIs, and advisory board to:

- research benefits of mutual mentoring for women in science,
- develop a database of isolated women physicists,
- develop a questionnaire that helps to match participants into groups, and
- plan the summit meeting of participants.
-

AAS & AIP
DATA SHARING SURVEY

Garrett Anderson and Roman Czujko

As part of a larger NSF-funded project, the American Astronomical Society (AAS) subcontracted with AIP to conduct a survey of recent corresponding authors of the four journals published by AAS and Physics of Plasmas published by AIP about their experiences with and opinions about the role of journals (publishers) in data accessibility. We focused our questions to ask specifically about sharing or working with datasets that generated the tables and figures in published journal articles. Of particular interest are the advantages and challenges of making such datasets available as supplements to published articles.

We created a sample of ~ 1,430 corresponding authors of articles published within the last 18 months from the five journals. Data collection began in December 2012 and was closed at the end of January 2013. We have 972 responses to the survey for a response rate of about 67%. Response rates were similar across all journals and for corresponding authors residing in and out of the U.S.

Preliminary analysis is underway. A significant number of respondents took the time to write comments in response to several open-ended questions and many of those comments were substantive. Quantitative questions appear, for the most part, to be clean. We will examine the data for differences by publisher. We will also examine the data with a sensitivity to differences in opinion by publishing experience, level of experience with sharing and acquiring datasets, and primary employment status (postdoc, professor, researcher at a gov't facility, etc.)

An internal report to the project leads (Chris Beimesderfer of AAS and Mark Cassar of AIP) summarizing findings and providing the verbatim comments of respondents should be completed around the time of the Advisory Committee meeting.

AIP JOURNAL AUTHOR SURVEY

Roman Czujko, Starr Nicholson and Mark McFarling

The 2012 AIP Journal Authors Survey was conducted to gather information about the reactions of authors who had recently submitted manuscripts to an AIP journal. The survey was intended to assess the opinions of authors about the electronic submission system, called Peer Express (PXP). The survey questionnaire was developed as a collaboration between the PXP division and the Statistical Research Center of AIP. The Peer Express group of the American Institute of Physics (AIP) is represented by Stuart Wortzman, Lisa McLaughlin and Diane Brzozowsky. Roman Czujko, Starr Nicholson and Mark McFarling represented the AIP Statistical Research Center which was responsible for hosting the survey on its servers, selecting the sample, contacting recent authors, collecting and analyzing the data, and preparing the final report.

The survey was conducted exclusively on-line and consisted of approximately 14 questions which asked corresponding authors to evaluate the manuscript submission process after using AIP's Peer Express (PXP) electronic submission system. We surveyed corresponding authors who submitted a manuscript between January 15, 2012 and February 26, 2012 to one of four AIP journals: Applied Physics Letters (APL), Journal of Chemical Physics (JCP), Journal of Mathematical Physics (JMP) and Physics of Fluids (PoF). Since the journals vary a great deal in the number of articles published, we surveyed a sample of the corresponding authors in APL and JCP, and all of the corresponding authors in JMP and PoF.

The first e-mail invitation went out on March 1, 2012. We sent out a second e-mail request on March 13, 2012 to those authors who had not responded to the initial request. In total, 674 authors were asked to participate and 68% (N=460) responded.

AIP MATTERS READERSHIP SURVEY

Starr Nicholson & Roman Czujko

AIP Matters is an internal publication of AIP intended to provide staff members with information about work-related activities across the corporation. This newsletter was launched 6 years ago as one form of internal corporate communication. It is distributed via e-mail to all AIP staff members on Monday mornings. In addition, the newsletter is distributed to selected non-staff members, including members of the AIP Governing Board, and senior staff and volunteers at AIP Member Societies.

The *AIP Matters* Readership Survey was conducted in two stages. The first stage focused on the primary audience, i.e. current AIP staff members. The second stage focused on non-staff reaction to the newsletter. The first stage was conducted by the Statistical Research Center to assess whether AIP staff members were satisfied with the quality, content and frequency of this internal newsletter. The questionnaire was designed by SRC staff members and Liz Dart Caron, director of Corporate Communications for AIP. The survey was conducted during December 2011 and we received data from 181 employees.

The responses to the *AIP Matters* survey were remarkably positive with many respondents writing comments that were very supportive of the newsletter and highlighted its value to them. Many respondents reported that their understanding of the work that other AIP units did had grown as a result of reading *AIP Matters*. In fact, very few respondents reported that they never read the newsletter.

The second stage of the survey was conducted during April and May of 2012. Of the 249 non-staff who received an invitation to participate in the survey, 95 responded. Based on the responses to the questionnaire and the comments that many individuals took the time to write, *AIP Matters* is very successful. Most of the non-staff who respondented (60%) indicated that they regularly read many of the articles and a very high percent (89%) reported that they increased their understanding of what AIP does as a result of reading *AIP Matters*.

Section 7

Contract Surveys

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AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE
PROFESSIONAL INFORMATION SURVEY

Julius Dollison & Roman Czujko

The Statistical Research Center has contracted with the American Association of Physicists in Medicine (AAPM) Committee on Professional Activities since 1986 to conduct their annual Professional Information Survey. The data from this survey have been summarized in the annual AAPM Salary Report. The data collection is done exclusively on-line and the report is no longer published in hardcopy format. The report covers Master's and PhD members both with and without board certification.

SRC conducted the survey from start to finish including designing the questionnaire, tracking the responses, collecting the data, analyzing the responses, and preparing the report. All regular AAPM members (5,297) in the U.S. and Canada received email invitations to participate in the on-line survey in April 2012. It was not sent to student, retired, associate or corporate members. Those who did not respond to the initial invitation received three more reminders during the month. All respondents (3,380) completed the questionnaire on-line with an overall response rate of 64%.

AAPM members were able to access copies of the final report on salaries and compensation for calendar year 2011 on the AAPM website in mid May of 2012. The SRC staff is gearing up for the 2012 survey which will be launched in March 2013.

AMERICAN ASTRONOMICAL SOCIETY WORKFORCE SURVEY

Rachel Ivie

As a result of the most recent National Research Council Decadal Survey in Astronomy and Astrophysics, the community came to realize that there is a shortage of certain types of demographic information on the astronomy workforce. Thus, the AAS Council formed a Demographics Committee and contracted with the SRC to conduct a survey of the astronomy workforce.

We worked with the Demographics Committee and designed a questionnaire that collects the following types of information from members of the AAS:

- Educational history, including highest degree held
- Employment status, including postdoc information and activities on the job
- Demographic information, including age, sex, race, and disability status

The survey was sent in January to half of the AAS members who are US residents. Currently, the response rate is 53%, and we expect to close the survey when we reach a 60% response rate, as the contract specifies. Then we will work with the AAS Demographics Committee to prepare a report from the data that addresses their specific data needs. As far as we understand, this survey may become a regular series for AAS.

AMERICAN ASTRONOMICAL SOCIETY (AAS) PUBLISHING FUTURES SURVEY

Rachel Ivie

In order to inform decision making processes for their leadership, the AAS contracted recently with the SRC to conduct a survey of authors, referees, and readers of AAS journals and similar journals produced by other publishers. The questionnaire will ask if respondents fall into any of these three groups and then present questions tailored to the respondents' experiences as authors, referees, and readers. The questionnaire also asks general questions about opinions regarding the structure of AAS publications, sharing of data used in the publications, and the value of peer review.

The questionnaire is in development and will have been sent to a sample of AAS members and a sample of corresponding authors who are not AAS members by the time of this meeting. We will prepare a report for presentation at an AAS publishing workshop in April 2013.

SPIN-UP: FOLLOW-UP SURVEY

Roman Czujko

About a decade ago, the American Association of Physics Teachers (AAPT), the American Physical Society (APS), and the American Institute of Physics (AIP) joined together to launch project SPIN-UP (Strategic Programs for Innovation in Undergraduate Physics). The project was funded by the ExxonMobil Foundation. The principal investigators were Robert Hilborn, Ken Krane and Ruth Howes.

The primary activity was site visits to 21 physics departments that appeared to be thriving, i.e. increasing their physics bachelor's degree production during the late 1990's when the number of physics bachelor's degree were in decline nationally. The site visits were completed during academic year 2001-02. Part of this project involved a survey of all physics degree granting departments to augment the information gathered during the site visits. The survey was carried out from April through June of 2002. The findings were reported in detail in the project SPIN-UP final report. The questionnaire focused on several essential issues including:

Faculty size
Number of degrees awarded at all levels, including minors
Courses and curricula, including multiple degree tracks
Recruiting physics majors
Interactions between faculty and students, e.g. the SPS chapter or physics club
Alumni tracking
Curricular reform including content and pedagogy

Follow-up Study

The project SPIN-UP team recently contracted with the SRC to conduct a follow-up survey using the identical questionnaire with the goal of developing accurate data on changes in undergraduate physics programs over the last decade. The date for the launch of this follow-up has not been set, but it is anticipated that it will be conducted during the spring of summer of 2013. This survey will be conducted under the direction of Ken Krane, who developed the original questionnaire instrument.

COMMITTEE ON THE STATUS OF WOMEN IN PHYSICS: CLIMATE SURVEYS

Rachel Ivie and Arnell Ephraim

Since 1990, the Committee on the Status of Women in Physics (CSWP) of the American Physical Society has been conducting site visits to physics departments to investigate their climates for women. During these site visits, the team evaluates the encouragement and support that students are receiving in an attempt to ensure that the department is welcoming for students of both sexes. The team also interviews faculty members to determine whether faculty members, especially women, feel they are receiving the resources and support they need to do their work.

Site visits are made at the request of physics departments. For several years now, the SRC has been conducting web surveys of students for CSWP in preparation for site visits. For each site visit, we prepared two reports based on the survey responses, one for undergraduate students and another for graduate students. We gave the reports to the site visit team prior to their visit. The reports are confidential and available only to the site visit team.

Until fall 2010, students at both graduate and undergraduate levels were asked to complete questionnaires describing their experiences in the physics department. At SRC's recommendation, APS decided to eliminate the undergraduate survey due to the low number of respondents and the lack of useful data collected. Data collection continues for graduate students whose departments are undergoing site visits.

In 2012, we conducted surveys in preparation for CSWP site visits at two universities. The graduate students were contacted multiple times: a pre-notice, a first request, and at least one reminder. The requests were sent out by the department, and the respondents were not tracked, so they are completely anonymous. We prepared confidential reports based on the survey findings and delivered them to the site visit teams.

CSWP also conducts site visits of government employers at their request. In 2012, SRC surveyed the employees at one government lab in preparation for a site visit. APS reimburses the SRC for the time spent on surveys of both employers and universities. In all cases, the survey data and results are proprietary to APS and the department or employer.

PhysTEC SURVEY OF PHYSICS DEPARTMENTS

Patrick Mulvey, Roman Czujko, and Starr Nicholson

The Physics Teacher Education Coalition (PhysTEC) is led by the American Physical Society (APS) in partnership with the American Association of Physics Teachers (AAPT). In 2012, PhysTEC contracted with the Statistical Research Center (SRC) of the American Institute of Physics to conduct a survey of physics department chairs to learn more about their efforts to prepare physics majors to become high school physics teachers. The study was directed by two PhysTEC representatives, Monica Plisch and Jacob Clark Bickenstaff.

The SRC conducted an almost identical survey for PhysTEC in 2009. This follow-up survey was used to evaluate whether there were any changes in the number of physics teacher preparation programs during the three years between the surveys. A core set of questions remained unchanged between the two surveys. Some questions from the 2009 survey were eliminated while a few new questions were added to the 2012 questionnaire. One such question expanded the scope of the survey to investigate the types of in-service offerings physics departments made available to current high school physics teachers. Department chairs were also asked if they offered a course on the teaching of physics and whether they provide professional development opportunities for current high school physics teachers.

The survey was conducted exclusively on-line. There were 733 physics departments that awarded a bachelor's degree in 2012 and they were considered candidates for having a physics teacher preparation program. The chairs were contacted by e-mail and invited to participate in the study. The survey was conducted during June and July 2012. We received useable responses from 541 departments for a final response rate of 74%. A report was produced and delivered to the APS by the date specified in September of 2012.

CTEC SURVEY OF CHEMISTRY DEPARTMENTS

Patrick Mulvey and Julius Dollison

The Education Division of the American Chemical Society (ACS) was interested in evaluating the extent to which chemistry departments were involved in improving and promoting the education of future and current high school chemistry teachers. The ACS formed a Chemistry Teacher Education Coalition (CTEC) similar to the Physics Teacher Education Coalition (PhysTEC). Because of our work with PhysTEC, the ACS contracted with the SRC to conduct a survey of chemistry departments. SRC staff members collaborated with CTEC representative Terri Taylor to develop a questionnaire instrument which paralleled the survey instrument that was used in the recent PhysTEC survey. Since the two studies had a similar question set, comparisons could be made between the efforts of the two disciplines to improve science education at the high school level.

The survey was conducted exclusively on-line. The ACS provided contact information for 730 chemistry departments that awarded a bachelor's degree in 2012 and they were considered candidates for having a chemistry teacher preparation program. The first request to participate was emailed to department chairs in Nov. 2012 and the fourth request was emailed in January 2013. We received useable responses from 537 departments for a final response rate of 74%. The analyses are complete and a final report is being prepared.

PROJECT-BASED LEARNING

Rachel Ivie and Susan White

Project-based learning is broadly promoted in science and engineering training. It emphasizes the application of knowledge over learning of theory through one or more overarching projects. These projects, which span more than one class period, often address real-world problems, tend to be interdisciplinary, and are group-work oriented. In the course, faculty members act as guides, providing content and scaffolding to encourage student engagement in ownership of the learning process. Over the course of the projects, students create one or more physical deliverables to reflect their work. There are few reliable studies that examine the impact of project-based learning on women.

Quantitative Analysis of 2008 Data

We have completed our work with Dr. Yevgeniya V. Zastavker, Associate Professor of Physics at Franklin W. Olin College of Engineering. She received a grant from the National Science Foundation to study project-based learning in math, physics, and engineering courses. We used quantitative methods to analyze survey data she gathered in 2008 from approximately 120 freshmen students. We also worked with Dr. Zastavker and her undergraduate students to complement the qualitative research they had done with the quantitative findings.

Since this is a contract survey, we are not at liberty to share results. Information on the NSF-funded grant is available here.

Attrition Study (2012)

We surveyed the students involved in the initial study to examine longer-term persistence and career choices of those who have been exposed to project-based learning. Dr. Zastavker surveyed the students four years ago, so most of them have graduated by now, and this gives us the opportunity to study persistence in their majors. Unfortunately, the number of students in the initial cohort was not diverse enough to provide robust analysis.

HUMANITIES INDICATORS SURVEY: ROUND TWO

Roman Czujko, Susan White, Raymond Chu, & Mark McFarling

The Statistical Research Center (SRC) contracted to conduct a second round of the Humanities Departmental Survey for the American Academy of Arts and Sciences. The full report from the first round is available online. (Click on the "Click for entire 2007-08 Humanities Departmental Survey report" link.) The original survey steering committee included representatives from the American Historical Association, the Modern Language Association, and the American Political Science Association. Other societies participating in the survey included the American Council of Learned Societies, the American Academy of Religion, the Linguistic Society of American, the College Art Association, and the History of Science Society. This represented the first united attempt by the societies to examine faculty and student issues. Areas of interest included:

- the number of faculty members in the various departments and programs
  - the number of faculty members by gender
  - the number of faculty members by rank
  - the number of faculty members by employment status (part-time or full-time)
- the number of undergraduate students majoring in the departments and programs
- the number of graduate students majoring in the departments and programs
- the distribution of teaching assignments for undergraduate classes for majors (full-time, tenured or tenure-track; full-time, contract; part-time; and graduate students)
- the distribution of teaching assignments for graduate classes for majors

Another goal of the initial 2008 survey was to develop baseline data against which future data can be compared. To obtain additional data, we have undertaken round 2. We added several new disciplines in this second round while retaining the same sample group we used in the first round for those disciplines. The new disciplines include philology (American Philological Association), philosophy (American Philosophical Association), folklore (American Folklore Society), communication (National Communication Association), and musicology (American Musicological Society).

Over the summer and early fall of 2012, we met with representatives from the American Academy of Arts and Sciences and the steering committee, and the questionnaire was finalized. The contact information for the departments in the original survey was updated and the sample frame for the new disciplines was developed during the summer and fall of 2012. The online questionnaire was launched in December of 2012 and distributed to approximately 2,200 departments. We have received responses from about two-thirds of the departments, including those that have told us they no longer have degree-granting status. We expect to complete data collection soon. We have also contracted for the analysis which will begin over the summer.