



# The Ottawa Medical Physics Institute:

## A Practical Model for Academic Program Collaboration in a Multi-Centre City

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National Research Council Canada

Conseil national de recherches Canada

UNIVERSITY OF OTTAWA  
HEART INSTITUTE  
INSTITUT DE CARDIOLOGIE  
DE L'UNIVERSITÉ D'OTTAWA



# THE CHALLENGE

How do you offer a comprehensive medical physics graduate program with only a small number of faculty at your local university?

The solution often implemented is to effectively relocate to the nearest large cancer clinic:

- ✓ qualified staff
- ✓ applied research
- ✓ specific focus



# THE CHALLENGE

Is there another way?

How about a multi-institutional approach?

But can you have a single coherent program with multiple partners?

What if you do it on a purely ground-up/volunteer basis?



# THE SOLUTION

- **The Ottawa Medical Physics Institute (OMPI)**
- A Carleton University Research Centre linked to the Department of Physics
- Community network of researchers
  - over 40 members across the Ottawa region
- this community makes the academic program possible

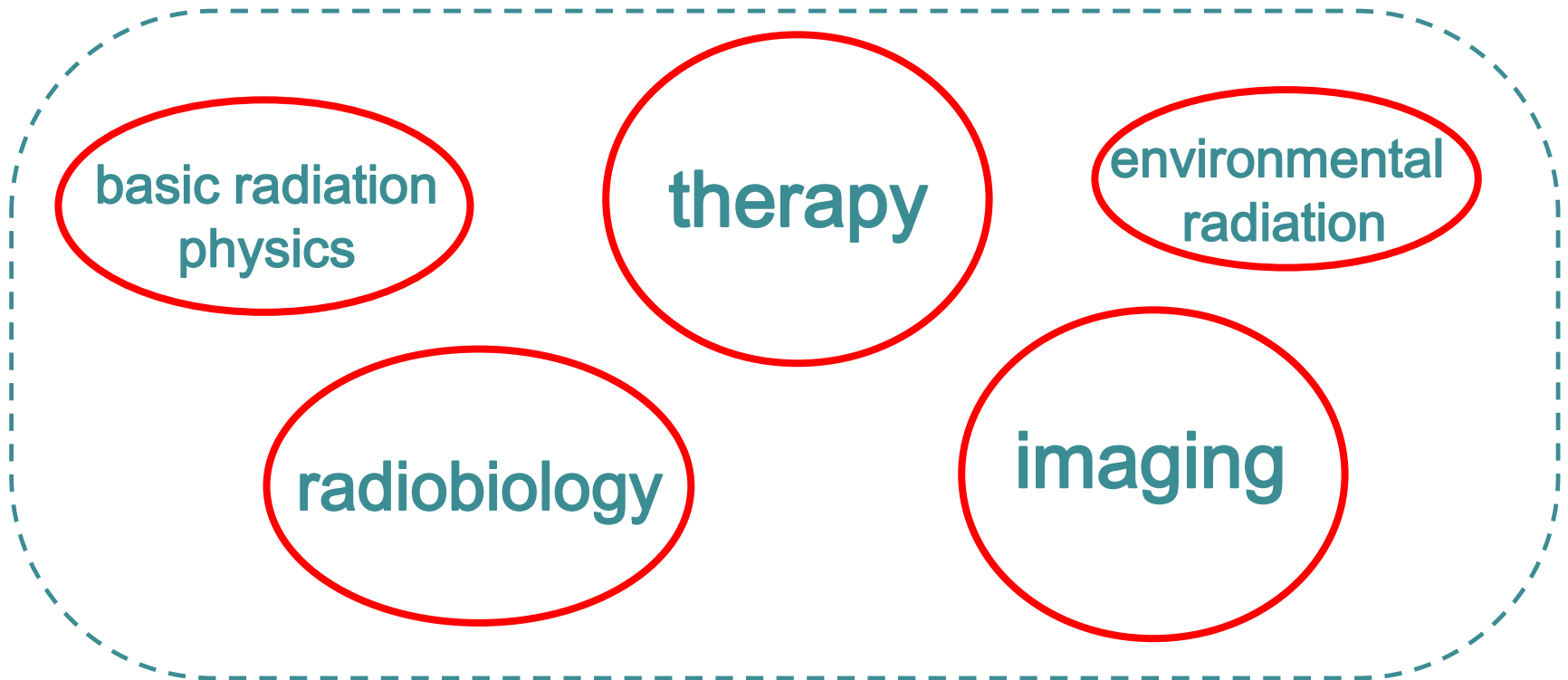
# What is OMPI?



## An institute without an institution!

OMPI is, first and foremost, a people-based organization

A space for researchers with different but overlapping expertise to share knowledge



A “bottom-up” approach to research strategy – driven by researchers

# What is that research?



- **Research areas on Carleton campus:**

- Dose calculations & treatment planning
- Positron-emission based motion tracking
- Novel x-ray imaging techniques
- Biophotonics for non-invasive diagnostics

**Wide range of  
research areas  
covering more  
than just clinical  
medical physics**

- **Research areas beyond those on campus:**

- Clinical radiation therapy (Ottawa Hospital Cancer Centre)
- Biological effects of radiation & environmental health physics (Health Canada, Can. Nuclear Laboratories, Chalk River)
- Reference dosimetry and Monte Carlo dose calculations (NRCC)
- Biomedical optics (NRCC)
- Nuclear medicine & MR imaging (The Ottawa Hospital, UOHI)
- Detection/localization of radiation sources for security & public safety (NRCan & NRCC)

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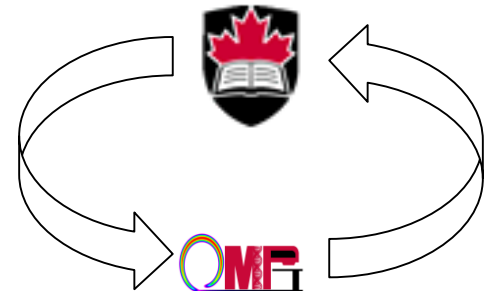
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Knowledge sharing is at two levels:

- 1) Peer-to-peer – end point is **collaboration**
- 2) Expert-to-student – end point is **education**

The energizer for the network is the Carleton University graduate program in Medical Physics

**Lots of opportunities for face-to-face engagement through regular seminars**



# How does OMPI contribute?



## Carleton courses specifically for medical physics:

- Medical Radiation Physics Emily Heath, Paul Johns (CU)
- Physics of Medical Imaging Tong Xu (CU)  
Ian Cameron (TOH)  
Rob deKemp (UOHI)  
Glenn Wells (UOHI)
- Medical Radiotherapy Physics David Rogers (CU)
- Radiobiology Ruth Wilkins (HC)  
Gosia Niedbala (TOHCC)
- Radiation Protection David Wilkins (TOHCC)  
Patrick Saull (NRC)
- Medical Physics Practicum > 10 physicists from the Hospital, Cancer Centre, UOHI, Health Canada, NRC
- Anatomy & Physiology for M.P. Tim Willett, MD

**Note the breadth of lecturers – expert presenters, varied perspectives**



# How does OMPI contribute?



## Fantastic range of thesis topics:

Imaging cardiac dyssynchrony

MC dose calculations for brachytherapy

Real-time tracking with PeTrack

Imaging quantitation of dedicated cardiac SPECT

Imaging motion correction in  $^{82}\text{Rb}$  imaging

Novel methods for biological dosimetry

Proton therapy dosimetry - measurement and calculation

Primary standards for LDR and HDR brachytherapy

Cellular dosimetry

Dynamic contrast enhanced MRI

Directional survey of dispersed radioactive contamination

Characterization of detectors for absolute and relative dosimetry

**Something for everyone!**

**A real opportunity for exploration for the student entering the program**

# Graduate Program Accreditation



- The Carleton PhD program in Medical Physics is accredited by CAMPEP
- Carleton's was the first program accredited by CAMPEP in Ontario
- currently 1 of 3 in Ontario, 1 of 11 in Canada
- the Cancer Centre achieved accreditation of its therapy physics residency program in 2007. Thus Ottawa is a very strong med phys educational centre.

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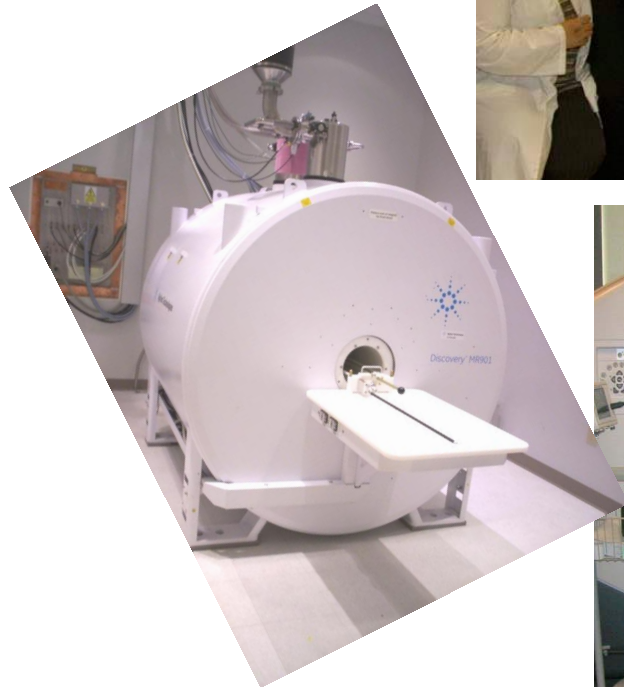
## **But it's not entirely virtual – geography is important**

One of the big advantages of a multi-institutional approach is access to those institutions' facilities.

These are significantly broader in scope (and larger in size) than possible in a university setting.

Access is not limited to a supervisor's students – this opens up the possibility of multi-institution collaborations within a student's thesis work

# World Class Facilities



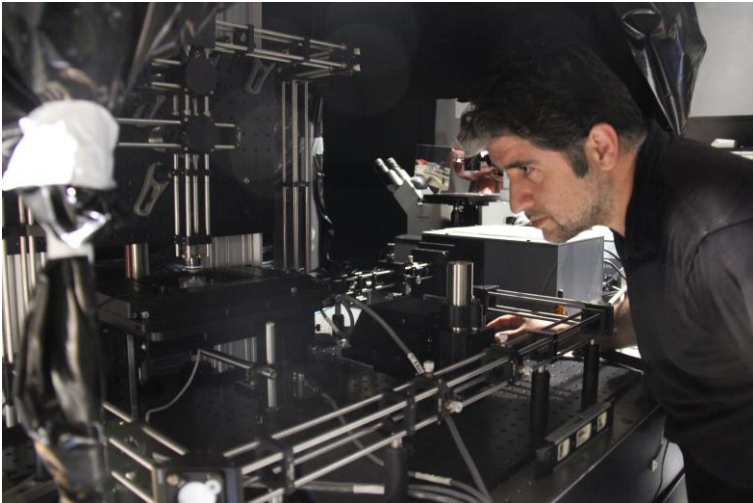
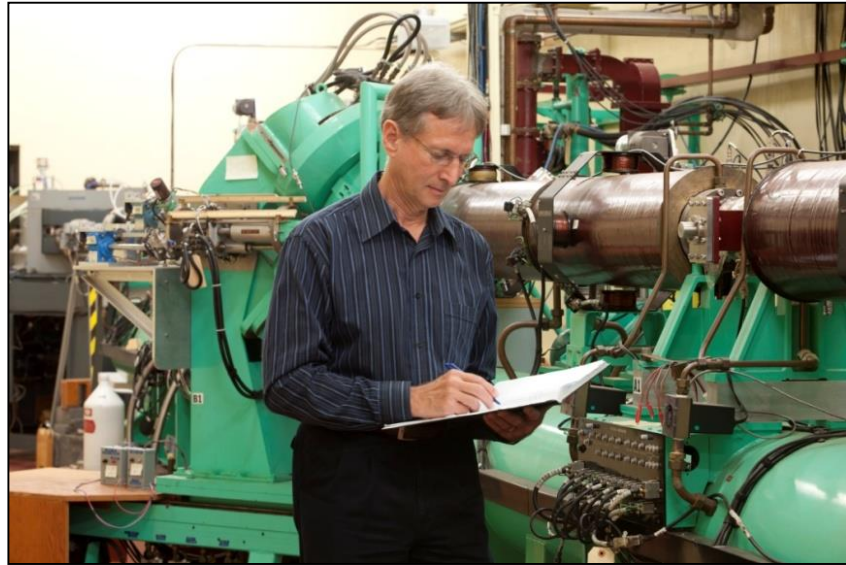
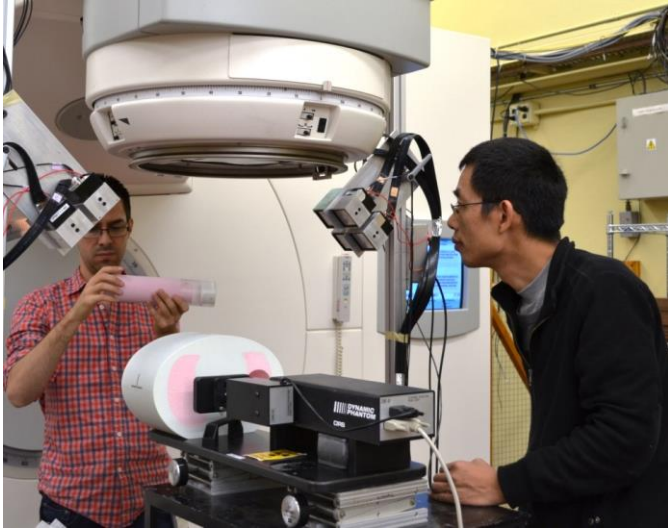
Imaging systems  
(SPECT, PET/CT, MRI)  
at the Ottawa Hospital  
and University of  
Ottawa Heart Institute

# World Class Facilities



Comprehensive facilities at the Ottawa Hospital Cancer Centre – IGRT linacs, Tomotherapy, Cyberknife, HDR

# World Class Facilities



PET-based motion monitoring,  
research linear accelerators, Raman  
spectroscopy, radiochemistry hot lab

# Out of this world facilities!



**Not available in any other program!**

Dr Laurel Sinclair and her team in Alert, Nunavut making measurements of ambient radioactivity.

The cosmic neutron rate varies significantly with latitude due to the varying geomagnetic cut-off





## **So, what's the result of all this?**

- A. High quality projects**
- B. High quality people**
- C. Exposure of students to a variety of career paths – academic research, clinical medical physics, government laboratories, industry, regulatory bodies.**
- D. Engaged membership open to collaboration**
- E. Larger group of “interested parties” (> 200 on our mailing list), making it easier to identify additional expertise that could contribute to OMPI’s activities.**





## **How does it work with all those institutions involved?**

As noted earlier, OMPI adopted a “bottom-up” approach

It is deliberately voluntary (and therefore flexible)

Membership is individual, not corporate

Focus is on the students and the research

OMPI does not ‘run’ the graduate program (reduces the commitment and responsibility)

Success breeds success! People want to join and be part of the OMPI community.

# Conclusion



- OMPI demonstrates that you can leverage small pieces of expertise in multiple institutions to create a world-class graduate medical physics program
- It is more than just a teaching environment although teaching is a core component
- At the 2015 World Congress of Medical Physics & Biomedical Engineering in Toronto, there were **27 presentations** (invited, oral, or poster) by OMPI members and students.



[www.physics.carleton.ca/ompi](http://www.physics.carleton.ca/ompi)