

## AbstractID: 13159 Title: Can single dataset in treatment planning system represent several beam-matched accelerators?

### **Purpose:**

Beam matched accelerators can provide the flexibility within the radiotherapy department. Furthermore, the accelerators could be represented by single beam data set in the treatment planning system (TPS). The aim of this study was to evaluate the match between dosimetrical characteristics of Elekta accelerators.

### **Method and Materials:**

The data from three accelerators was used in analysis. Three photon and six electron beams were matched according to the vendor specification. The first accelerator data served as reference. Subset of commissioning measurements for second and third accelerators was performed. The comparison was done in absolute terms, i.e. that PDDs and profiles were used with corresponding accelerator output factors.

### **Results:**

The average difference between the sets of open field PDDs was -0.7%, -0.1% and -0.1% for 6, 10 and 15MV, respectively. Difference up to -2.2% was observed for 60° motorized wedge PDDs. Aligned profiles showed good agreement, with differences generally less than 1% at  $d_{max}$  and 10 cm for field sizes up to 30x30 cm<sup>2</sup>. For 40x40 cm<sup>2</sup> diagonal profiles at  $d_{max}$  the maximum differences of 2.4% was observed. The difference of up to 4.5% between output factors for small fields have been observed which may result in larger discrepancies in IMRT fields.

### **Conclusion:**

Beam match for photon beams showed a satisfactory agreement for open fields and support the use of a single data set for TPS. However, vendor's beam matching criteria is not strict enough and better beam matching could be achieved if instead of single value the subset of dosimetrical data is used together with corresponding output factors for both open and wedged fields. Although, scanned data for electron beams showed good agreement larger differences (up to 5%) in electron cone output factors does not support the use of a single dataset in TPS.