

## AbstractID: 8776 Title: Evaluation of a biplanar diode array detector for MLC- and compensator-based IMRT QA

### **Purpose:**

To evaluate a biplanar diode array detector, with two types of modulators used for IMRT – MLC (step-and-shoot) and brass compensators. All calibration procedures were evaluated.

### **Method and Materials:**

An absolute calibration procedure in the rectangular PMMA phantom was evaluated and compared to water phantom measurements. IMRT plans were prepared on CMS XiO and modulated by either 120-leaf MLC or brass compensators. 10 MLC based plans and 7 compensator plans were tested. Dose calculations were done on a homogeneous dataset and on an MVCT of the Delta4 phantom.

### **Results:**

Effective point of measurement is at the midplane of the detector board. The PMMA to water conversion factor for absolute calibration with ion chamber is 0.988. An effective TMR calculation yields the same calibration dose. Angular response range is 0.977-1.033 (0.977-1.010 if the angles of  $\pm 5^\circ$  around the detector planes are excluded, consistent with the intended use of the device). Point doses along the fan lines differ -0.6 to +0.3% from those calculated on a homogeneous dataset, and -0.9 to -2.2% from those on the MVCT dataset. For 7 compensator plans, the average percentage of detectors with  $\gamma(5\%/3\text{mm}) \leq 1.0$  is 97% (range 89-100%). For 10 MLC plans the average is 93% (72-100%), but the statistics may be skewed because some detectors are frequently at the very edge of the beamlet aperture while others are always at least 5 mm away.

### **Conclusion:**

For absolute dosimetry measurements the PMMA output to water conversion factor needs to be determined using an appropriate calibration technique. There was no advantage in utilizing an MVCT dataset. It is desirable to have a software modification (isocenter shift) to ensure that the reported dose statistics are always representative of the population.

### **Conflict of Interest:**

G. Nilsson is President of ScandiDos, who loaned the unit for evaluation at no charge.