

## AbstractID: 6668 Title: Use of a two-dimensional ionization chamber array for proton therapy quality assurance checks

**Purpose:** To investigate the characteristics and the suitability of a two-dimensional ion chamber array detector for proton therapy quality assurance dosimetry measurements.

**Methods and Material:** Matrixx (Scanditronix-Wellhofer, Bartlett, TN) is equipped with 32 x 32 parallel plate ion chambers with 4.5 mm diameters and separation of 7.5 mm. The water equivalent thickness (WET) for buildup material was determined by measuring the shift of the location of 90% distal dose point measured using plastic water relative to the depth dose measurement in water tank using a Markus chamber. The measured WET of the build up material was found to be  $3.9 \pm 0.1$  mm. The device was used to obtain the profiles and isodose distribution for the patient portals at different depths. The dose distribution calculated by the Eclipse Treatment Planning Systems (TPS) was imported to Matrixx for comparison purpose. The Matrixx was also used for the determination of absolute dose at a calibration point and the monitor units to be used for patient treatment.

**Results:** The point dose measured by Matrixx was found to be within 1% of that measured by a Framer type chamber. However, the penumbra width for open field for 250 MeV measured with matrix was 1.58 cm as compare to 1.24 cm measured in the water tank using a PTW pinpoint chamber. This significant difference in penumbra width is mainly due to the large inter-chamber separation in Matrixx. The measured 2-D dose distribution by Matrixx agreed well with that from TPS. Most of the differences in the separation of a given isodose line were within 2mm.

**Conclusion:** The device is found to be well suited for measurement and verification of proton therapy dose distribution of patient treatment fields. Measurements are in real time, which makes this device more convenient compare to film dosimetry.