

AbstractID: 8750 Title: A 2D ion chamber array detector as a QA device for spot scanning proton beams

Purpose: To evaluate a 2D ion chamber array detector as a quality assurance device for spot scanning proton beams at the Proton Therapy Center-Houston (PTC-H).

Method and Material: The proton therapy machine at PTC-H is equipped with a spot scanning delivery system in one of its gantry. The machine can deliver beams in energy range of 70-250 MeV corresponding to 4.08-37.94 cm depths in water, respectively. We have used a 2D ion chamber array detector to measure the depth dose curve and the dose profiles at different depths in a plastic water phantom for a single spot scanning proton beam with a nominal range in water of 10.5 cm. The 2D array device is equipped with 32 x 32 parallel plate ion chambers, each with 4.5 mm diameters and 7.5 cm center-to-center separation.

The depth dose and profiles were compared with the ones measured using an ion chamber in the water.

Results: The range of proton beam corresponding to the distal 90% depth dose was found to be within 1-mm of that obtained from measurements using a Markus ion chamber measurement in water. The 2D lateral profile at depth of 10.39-cm agreed well with the profile measured in a water phantom using a PinPoint ion chamber. A Gaussian fit of the profile data predicated one sigma parameter of 9.4-mm at a depth in water of 10.39-cm.

Conclusion: The results indicate that the 2D in chamber array detector is a suitable device for quality assurance checks of spot scanning proton beams.