Proton Beam Imaging Based on Energy Resolved Dose Measurements

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Abstract

The depth-dose distribution of proton beam around the Bragg peak is very sensitive to both the depth of penetration and the energy of the incident proton beam. One can measure the dose at a specific point on the beam path as a function of the incident beam energy to obtain an energy resolved dose function (ERDF). For a given set of incident beam energies, the measured ERDF is unique to the water equivalent path length (WEPL) to the point of measurement. We have taken advantage of this effect and developed a technique to determine the WEPL values through objects for proton radiography and tomography. Since only a single quantity, i.e., the dose (or dose alike response), needs to be measured, a single detector, e.g., a flat panel used typically for X-ray imaging, will be sufficient. The presentation will review our methods and results for passive scattering systems as well as initial exploration for adaption to pencil beam scanning.

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