AbstractID: 8813 Title: Out-Of-Field Dose Equivalents Delivered by Passively Scattered Therapeutic Proton Beams for Clinically Relevant Field Configurations

Purpose: Microdosimetric measurements were performed at the Francis H. Burr Proton Therapy Center at Massachusetts General Hospital to assess the dose equivalent external to passively delivered proton fields for various clinical treatment scenarios. **Method and Materials:** Treatment fields evaluated included a prostate cancer field, a cranial field for a medulloblastoma patient, a spinal field for a medulloblastoma patient, an ocular melanoma field, and a field for an intracranial stereotactic treatment. Measurements were completed using patient specific bolus and aperture combinations with clinically relevant treatment settings. This work was conducted using a silicon-on-insulator microdosimeter that was placed on the surface of and at various depths within a homogeneous plexiglass phantom to assess the dose equivalent and average quality factor as a function of both lateral distance from the treatment field edge and distance past the distal edge of the spread-out Bragg Peak (SOBP). **Results:** Dose equivalent values ranged from 3.5-0.12 mSv/Gy (2.5-60 cm lateral displacement) for a typical prostate cancer field, 4.3-0.23 mSv/Gy (2.5-40 cm lateral displacement) for the cranial medulloblastoma field, 1.0-0.23 mSv/Gy (5-20 cm lateral displacement) for the spinal medulloblastoma field, and 0.2-0.03 mSv/Gy (2.5-10 cm lateral displacement) for the ocular melanoma field. Measurements of external field dose equivalent for the stereotactic field case exhibited differences as high as 50% depending on the modality of beam collimation. Average quality factors derived from this work were typically in the region of 2-7, with the value largely dependant on the position within the phantom in relation to the primary beam. **Conclusions:** This work has allowed for accurate comparison of the external field dose equivalents for various passively scattered proton treatment fields and provides valuable, clinically relevant data.