

AbstractID: 10820 Title: Acceptance and clinical commissioning of a uniform-scanning proton therapy system

Purpose: Acceptance and clinical commissioning of a uniform-scanning proton therapy system. **Method and Materials:** Uniform Scanning (US) is one of the proton delivery modes of the gantry-mounted Universal Nozzle (IBA). In US, a large pencil beam is scanned in a rectangular pattern to cover a field-specific aperture. The spread-out Bragg peak (SOBP) is created using energy-stacking. The system is commissioned by measurement of depth dose curves and lateral profiles using a variety of devices, including 3D water phantom, Matrixx detector, and multi-layer ionization chamber (IBA Dosimetry). Treatment planning system is Varian Eclipse. **Results:** Target sizes of up to 40cm in the inline and 30cm in the crossline direction can be covered. Range can be varied continuously between 4.0 and 32.4 g/cm²; beams can be modulated up to skin. Dose uniformity is $\leq 3\%$ in the uniform region. Range accuracy is found to be ≤ 1.5 mm over the complete range span. The treatment-planning dose matches measurement within 3% in the uniform region. In the proximal region, treatment planning underestimates the dose by up to 6%. Difference between planned and measured in-water penumbra is found to be less than 1mm, for air gaps smaller than 15cm. **Conclusion:** Uniform scanning meets its design specifications and has successfully been commissioned for clinical use. Treatment sites that benefit include deep-seated prostate, large sarcoma, and cranial-spinal targets.