

## AbstractID: 1556 Title: The use of Wobbling in the delivery of SOBP proton fields

Spread-out Bragg peak, SOBP, proton fields have been the common method of delivering proton treatments. SOBP fields are formed by the superposition of multiple, successively range-shifted, and individually weighted pristine Bragg peaks such that the composite dose distribution is characterized by a slowly rising dose region, a uniform flat dose plateau and a steep distal dose fall-off. The popularity of SOBP fields is due to the ability of producing these fields through mechanical means with so-called range-modulator wheels in combination with thick, field-flattening scatterers. These wheels introduce the appropriate range-shifting material during a specific angular interval, to produce the composite SOBP. This mechanical, double-scattering method has a large penumbra and a maximum field size of approximately 25 cm diameter. Wobbling is a non-mechanical method where a coarse proton pencil-beam is scanned over the desired field size (up to 30x40 in our case) for a duration related to the contribution of the individual pristine Bragg peaks. Wobbling does not require scatterers and improves the dosimetric properties of the SOBP field. Wobbling is a dynamic delivery method and is a subset of full dynamic pencil-beam scanning. We present results on our control strategy to deliver wobbling SOBP fields. This strategy considers the appropriate layering strategy and forward feedback to ensure that the delivered dose remains within the clinically prescribed dose under all circumstances. We also present the dosimetric results for the SOBP fields and the method used to calibrate and deliver SOBP fields of arbitrary distal range and modulation.