# AbstractID: 7075 Title: Dose engine verification of a dual-level mMLC-based treatment planning system benchmarked by MCNPX and Pinnacle

**Purpose:** To evaluate and verify a dose engine by comparing 3D dose matrices calculated by a dual-level micro multileaf collimator based treatment planning system (TPS) benchmarked by MCNPX and Pinnacle$^3$ TPS

**Method and Materials:** An irregular aperture shape was created by a dual-level micro multileaf collimator (mMLC) and dose was delivered through the aperture to a cylindrical solid water phantom with a 6MV Varian 600C linear accelerator. A Monte Carlo model was designed by using MCNPX according to the configurations of the linac source, jaws, aperture shape and phantom. The computed dose matrices from CrossPlan, a specially design TPS for mMLC, and MCNPX were compared against each other and the radiographic films. The isodose distributions, profiles, and gamma analysis were parameters used for comparison. 3D dose matrices from CrossPlan and MCNPX were converted and exported to Pinnacle$^3$ TPS for further comparison.

**Results:** The isodose overlay, gamma analysis, and dose profiles generated by both CrossPlan and MCNPX closely matched each other. The mean dose difference was less than 1.4%, and the gamma index values were less than one. The computed dose images from CrossPlan and MCNPX matched well with the radiographic films. The isodose and DVH comparisons by Pinnacle$^3$ further demonstrate the agreement of the 3D dose matrices from CrossPlan and MCNPX.

**Conclusion:** The good agreement between the computed dose from CrossPlan and MCNPX compared with the radiographic films indicated that both CrossPlan and MCNPX dose engines produce reliable and accurate dose distributions. The CrossPlan based dual-level micro-MLC is capable of precise aperture shaping, potentially allowing for an improved intensity modulated radiation therapy (IMRT) plan and delivery.

**Conflict of Interest:** Supported by Initia Medical Technology