AbstractID: 6932 Title: Adaptation of the RPC IMRT prostate phantom for full 3D dose verification using polymer gel and multiple-plane radiochromic film inserts

Growing use of high-tech treatment modalities such as 3-D-conformal and IMRT radiotherapy has raised concerns for a means to experimentally validate these complex irradiations. The dynamic nature of IMRT delivery poses unique problems relating to the accurate and reproducible quality assurance of dose delivery. Dose distributions generated in intensity modulated radiation therapy (IMRT) often have complex shapes with high dose gradient regions surrounding critical patient structures. Currently, there is no standardized means for evaluating IMRT treatment delivery. We (SUNY Stony Brook) have modified the dosimetry system for the anthropomorphic prostate phantom developed by the Radiation Physics Center (RPC) to allow for full 3D dose verification. The original RPC prostate phantom consisted of a water-filled torso with femoral heads and allowed for insertion of an imaging insert (prostate, rectum and bladder) as well as a dosimetry insert that has radiochromic film for measuring dose in two orthogonal intersecting planes, and two TLD's for point-dose verification. A separate *hybrid-dosimetry inser*t was designed at *Stony Brook* that consists of a cylindrical shell phantom made from high-impact polystyrene, with CT-MR compatible markers embedded in the wall. This cylindrical shell takes both a *radiochromic film insert for multiple-plane measurements* and *polymer gel insert* made from barex, and provides an alternate means for full 3D dose verification. We report on the *SB hybrid-dosimetry insert* design features and C++ routines used to automate the detection and registration, and investigate the limitations on dose-verification. An example IMRT treatment verification will be presented.