AbstractID: 11468 Title: Effect of transverse magnetic fields on MV photon dose distributions in heterogeneous media

Purpose: To study the effect of transverse magnetic fields on dose deposition profiles in regions of mass density gradients. This work characterizes this effect with a simple Monte Carlo model of a lung tumor irradiated with a 6 MV photon beam. **Method and Materials:** The Geant4 Monte Carlo toolkit was used to simulate the irradiation of a simple phantom representing a lung tumor. A 4 cm spherical tumor made of soft tissue (1.06 g/cm^3) was positioned at the center of a 14x14x14 cm^3 box made of lung tissue (0.3 g/cm^3). A uniform magnetic field was applied throughout the phantom perpendicularly to the beam axis. Simulations were conducted with field intensities ranging from 0 to 5 tesla. The phantom was irradiated with a 6 MV photon beam created with the BEAMnrc code. **Results:** Significant dose modulation was observed at the lung-tumor interface. Regions of dose enhancement and symmetrically opposed regions of dose reduction were observed at the vicinity of the tumor boundary. These regions vary in shape, intensity and location with field strength in a non trivial way. As a rule of thumb, these crescent-like regions tend to become sharper and shift rotationally with field strength. **Conclusion:** Magnetic fields were shown to affect significantly dose deposition profiles in heterogeneous media. Further investigations are required to understand the pattern of dose modulation as a function of magnetic field intensity, heterogeneity size and heterogeneity surface orientation relative to beam axis. Devising approaches to potentially exploit or cancel out these effects is also of interest.