# AbstractID: 7603 Title: Shielded catheters for HDR

As with all brachytherapy treatment, the dose-distance relation in high dose rate (HDR) strongly depends on the inverse-square law. As a result, sensitive healthy tissues — such as the rectum for prostate treatment — may receive a significant fraction of the prescribed dose. The purpose of this study is to investigate if sub-millimeter thick shields incorporated to a catheter can be used to produce an anisotropic photon fluence and hence protect healthy tissues. The GEANT4 Monte Carlo code is used to model shielded catheters and calculate the resulting anisotropy in dose. Models of a modified 13 gauge catheter are described. The shielded catheters are made from polyoxymethylene into which are embedded small hemi-cylindrical metallic pieces, separated by gaps to maintain flexibillity. Single and two-parts catheters are considered. Among the best shielding materials are iridium, platinum and gold. The dose is calculated in the transverse plane as well as in the longitudinal plane to show the effect of the gap between the shield sections. The ratio of the dose at 1cm on the shielded side to the dose on the non shielded side is reported for several thicknesses and materials. The best dose reduction is obtained with (non radioactive) iridium (28-32% for 470-650 μm thick shields). Gold (25-28% reduction) might be preferred over iridium because it would be easier to manufacture. In a typical prostate implant, only a few (about 4) of these catheter could be use on the posterior part of the prostate to protect the rectum.