Contribution ID: **66** Type: **Parallel Talk**

Optimization and experimental characterization of a 3 points plastic scintillator dosimeter

Purpose: This study is devoted to optimize and characterize the response of a multipoint plastic scintillator detector (mPSD) for in vivo dosimetry.

Methods: A 3 points mPSD was constructed and characterized in terms of response to interacting ionizing photons.The detector was composed of BCF-60, BCF-12 and BCF-10 scintillating fibers, separated from each other by segments of clear optical fibers.Some configurations were constructed in order to determine the appropriate scintillator position to the photodetector (distal, center or proximal), as well as their width as function of the scintillation light emitted and spatial resolution.Each scintillator contribution to the total spectrum was determined using lead shielding.For the best configuration, measurements were conducted at 120, 220 kV, 6 MV as well as with an 192Ir HDR Brachytherapy source, and parameters such as SNR, energy and angular dependence were evaluated.

Results: It was determined that BCF-60 should be placed at the distal position, BCF-12 in the center and BCF-10 at proximal position respect to the photodetector.This configuration allowed: to avoid the inter-scintillator excitation, signal self-absorption and optimizing the light transmission through the collecting fiber.For the same scintillator width, it was observed that the scintillation process is more efficient in BCF-10, being the optimal width found 3, 6 and 7 mm for BCF-10,12 and 60 respectively.As expected no energy or angular dependence were observed.SNR analysis demonstrates that up to a source –mPSD distance of 5 cm, our system is sensitive enough to perform HDR brachytherapy dose quantification.

Conclusions: An optimized 3 points mPSD was designed and characterized in this work based on the spectral response at different conditions, constituting a baseline for future applications. Measurements with 192Ir evidenced that this detector could be a promising alternative for in vivo dosimetry in brachytherapy.

Authors: Mrs LINARES ROSALES, Haydee Maria (Department of Physics, Université Laval and CHU de Quebec, Quebec, Canada.); Mr ARCHAMBAULT, Louis (Department of Physics, Université Laval and CHU de Quebec, Quebec, Canada.); Mr BEDDAR, Sam (The University of Texas MD Anderson Cancer Center, Houston, United States.); Mr BEAULIEU, Luc (Department of Physics, Université Laval and CHU de Quebec, Quebec, Canada.)

Presenter: Mrs LINARES ROSALES, Haydee Maria (Department of Physics, Université Laval and CHU de Quebec, Quebec, Canada.)

Session Classification: Parallel Session - MP

Track Classification: Medical Physics