**Analytical and Monte-Carlo modeling of Multi-Parallel Slit and Knife-Edge Slit Prompt Gamma Cameras.**

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Ion-range monitoring by means of prompt gammas (PG) detection is currently investigated for hadrontherapy verification. These PG are emitted during nuclear reactions undergone by incident ions and secondary particles and they can be detected with various systems, such as collimated and Compton cameras [1]. From a general point of view, the performances of collimated cameras are mainly determined by a compromise between spatial resolution and detector efficiency.

While collimator features have been extensively investigated in the context of nuclear imaging, no theoretical considerations have been proposed for the specific 1D collimation systems developed in the context of ion-range verification during hadrontherapy, namely Multi-Parallel Slit (MPS) [2] and Knife-Edge Slit (KES) collimators [3].

The present study proposes an analytical model of these two types of collimation that allows for deriving the intrinsic features of MPS and KES collimators and comparing the current prototypes developed by IBA and the CLaRyS collaboration. Monte-Carlo (MC) simulations were performed to evaluate the model and to perform deeper comparisons between the two camera systems.

The analytical model shows that the two types of collimation share at first order the same features in terms of detection efficiency and spatial resolution. This result confirmed by MC simulations will be followed by the comparison of the prototypes precision in PG profile fall-off retrieval.

[1] Krimmer NIMA 2018 “Prompt-gamma monitoring in hadrontherapy: A review”

[2] Pinto PMB 2014 “Design optimisation of a TOF-based collimated camera prototype...”

[3] Smeets PMB 2012 “Prompt gamma imaging with a slit camera...”

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