

# COMPARISON OF VARIOUS MODELS OF MONTE CARLO GEANT4 CODE IN SIMULATIONS OF PROMPT GAMMA PRODUCTION

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In this paper we are presenting results of simulations of gamma production in reactions with 70 MeV protons in a target of PMMA (poly(methyl methacrylate)). The results obtained by means of three versions of Geant4 software [1] (ver. 4.9.3, 4.10.1 and the newest one - 4.10.2) have shown significant differences in the gamma spectra simulated. Comparison of the results was restricted to spectral lines stemming from the transitions  $^{16}\text{O}_{6.13 \rightarrow \text{g.s.}}$  and  $^{12}\text{C}_{4.44 \rightarrow \text{g.s.}}$ . The main difference in the source code between the considered versions of Geant4 is in the implementation of the binary cascade model. Comparison between Geant4 simulations and experimental data obtained in the GammaCCB experiment [2] have been performed. The emission lines present in the measured gamma spectra are also present in the simulated ones, though the relative intensity differs. Results obtained with the Geant4.10.1 version are in best agreement with experimental data among all studied versions. The presented investigations will be used for the preparation of the method of determination of the Bragg peak depth based on the analysis of prompt gamma spectra.

## REFERENCES

- [1] Geant4 Website <http://geant4.web.cern.ch/geant4/support>
- [2] A. Wrońska et al., Gamma Emission in Hadron Therapy — Experimental Approach Contribution to the Proceedings of Zakopane Conference on Nuclear Physics Extremes of the Nuclear Landscape Acta Phys. Pol. B 46 (2015) 753.