

Proton Bragg curves in water for 67.5 protons

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Short description: A 67.5 MeV proton beam with a Gaussian energy spread of 0.4 MeV, and a uniform 5 mm x 10 mm oval spot travels through a tantalum (Ta) foil of either 101.6 micrometer or 381 micrometer thickness. Then the beam interacts with a secondary emission monitor (SEM) and a kapton exit window before reaching a mylar wall and water phantom of 280 mm x 280 mm x 50 mm with back surface located downstream the Mylar wall.

Geant-val layout: LowEProtonBraggBeak

Reference data: The depth-dose curves in water (ionization potential $I=78$ eV) are calculated and then fitted with an analytical expression for the Bragg curve. The fitting parameters range R and spread sigma are compared against the corresponding experimental parameters from depth-dose measurement from [1]

[1] Faddegon B, Shin J, Castenada C M, Ramos-Méndez J and Daftari I K Experimental depth dose curves of a 67.5 MeV proton beam for benchmarking and validation of Monte Carlo simulation Med. Phys. 42 4199 210 (2015)

Tested EM physics constructors:

- *G4EmStandardPhysics_option3*
- *G4EmStandardPhysics_option4*
- *G4EmLivermorePhysics*
- *G4EmPenelopePhysics*

Tested Hadronic physics:

- *QGSP_BIC_HP*

-- SusannaGuatelli - 2019-04-18

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