Nuclear recoils: when to generate or supress

V.Ivanchenko
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Nuclear recoil

- Residual nucleus usually produced in nuclear reactions

- In many case this residual nucleus has very small kinetic energy and correspondingly very short range

- In what case we should kill these recoil and not send to the list of secondary particles?

Current status

- In G4HadronElasticProcess recoil is not produced if its kinetic energy is below production threshold for protons
- User can defined cut in range for protons, it is converted using linear relation into production threshold
  - 1 mm cut corresponding 100 keV threshold
- This is important only for elastic scattering because elastic happens much more frequenty than inelastic, especially forlow-energy neutrons
  - Not a problem to add to inelastic or stopping if it will be needed

Problem

- In G4HadronElasticProcess there are two extra internal thresholds for neutrons and for other particles
  - These thresholds were added in order to avoid numerical problems happens with very low-energy recoil nuclei
- With time the origine of problems may be already resolved but it is difficult to abandon these threshold without running large validation at GRID
  - It is dangerous to remove these thresholds for 9.6 because we likely will not be able to check all use-cases