

# Update: Electron Mode in FRENSE

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FRENSE Meeting

February 17, 2015



## Capabilities

- Single Scattering Events from 100 GeV to 10 eV
- Elastic, Bremsstrahlung, Electroionization, Atomic Excitation
- Secondary particles created, but photons not tracked
- Atomic relaxation implemented

## Problems

- Absorption at low energies
- Negative energy from Electroionization

- At energies near the cutoff (10 eV) the reaction cross section is dominated by elastic scattering (by order  $10^7$  for H)
- It is unlikely the electron will scatter below the cutoff energy
- A temporary fix is to raise the cutoff energy (to 15eV for H) to prevent indefinite elastic scattering
- No mention of this issue in MCNP or Penelope



- ACE tables provide CDF of the knock-on energy,  $E_{knock}$ , based on the incident electron energy.
- When the incident electron energy is between two tables a weighted random variable is used to chose the appropriate table
- This can result in a  $E_{knock}$  that is larger than physically possible
- In this case the energy of incident electron is reduce to  $1E-15$
- MCNP avoids this by interpolation between tables, which is more computationally expensive



## Testing

- Run tests in MCNP and FRENSE for comparison
- Start with Hydrogen spheres

## Possible Further Work

- Create testing mode where no secondary particles are created
- Implement other options for the bremsstrahlung photon ejection angle