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Proton induced spallation reactions investigated within the framework of BUU model

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Logistics of BUU calculations

- initialization of nucleus (nuclei); positions of test particles (according to Saxon-Woods formula of nuclear density)
- initialization of incoming proton; positions of its test particles are distributed on disk (i.e. averaging on impact parameters)
- initialization of momenta for test particles of incoming proton; they are all set to momentum equivalent to kinetic energy of proton
- initialization of momenta for test particles of nucleus (nuclei): they are chosen for every test particle randomly, from 0 to local Fermi momentum p_F ; it depends on local nuclear density ρ

$$p_F = (3\pi^2 \rho)^{1/3}$$

Logistics of BUU calculations

- beginning of time loop; typical time step 0.5 fm/c
- at every time step:

1. nuclear density is calculated on three dimensional grid, d = 1 fermi
2. it is checked whether given pair of particles (nucleons) is close enough to interact
3. if particles (nucleons) will come closer in next time step postpone collision
4. if given test particle does not collide, propagate it (i.e. modify its position, momentum) using Hamilton equation

Logistics of BUU calculations

- if given pair of test particles (only binary collision are considered) collides, specific reaction is chosen using branching ratios; Pauli blocking phase space densities f1, f2 are calculated; g1=(1-f1), g2=(1-f2) are calculated; two random numbers r1, r2 from [0,1] are chosen; if r1>g1 and r2>g2 then reaction is allowed, if it is not this case it is blocked

Logistics of BUU calculations

- at the end of time loop all Delta resonances are forced to decay