Physics with neutrons 1

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Winter semester 2016/17
Exercise sheet 4
To be discussed 2016-11-18, room C.3202

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EXERCISE 4.1

Neutrons from fission ($E \approx 2\,\mathrm{MeV}$) are slowed down to the thermal regime ($E \approx 20\,\mathrm{meV}$) by scattering with the atoms of a moderator material. We assume that the scattering is purely elastic and nonrelativistic. Calculate the energy loss per collision event depending on the mass of the moderator atoms and on the scattering angle. How many collisions are needed to moderate fission neutrons to thermal neutrons in H_2O, D_2O and graphite? Use Monte Carlo simulation to produce a velocity distribution of the moderated neutrons and simulate the number of collisions needed for the neutron thermalisation.