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Analysis of neutron-induced secondary stars in the multiple dissociation of krypton nuclei at 950 MeV per nucleon

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In the dissociation of neutron-rich krypton, neutron emission accompanies the formation of charged fragments. Information on neutron multiplicity and angular distributions complements the analysis of α -particle correlations and helps characterize the composition and kinematics of the breakup products. Estimating the sensitivity of nuclear emulsion to this neutron component is therefore an important methodological step in the study of such fragmentation channels.

Secondary interaction vertices (stars) without an incoming charged-particle track provide an indirect probe of neutrons produced in the multiple dissociation of krypton nuclei at 950 MeV per nucleon in nuclear emulsion. We examine the topological criteria for identifying candidate neutron-induced stars within the fragmentation cone defined by relativistic hydrogen and helium fragments, and quantify the role of observation geometry using Geant4 simulations.

Neutron and proton transport at a kinetic energy of 950 MeV is simulated with the QBBC physics list in a homogeneous emulsion model. Two configurations are compared: transverse passage through a 4 mm layer and emission from a fragmentation vertex with an effective path length of 45 mm.

These estimates demonstrate the strong geometrical dependence of sensitivity to the neutron component. They provide a basis for interpreting the frequency of secondary stars statistically, with the efficiency of identifying stars without an incoming track requiring separate assessment.

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