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Cross sections for the star configurations of the d(160 MeV)+p->p+p+n breakup reaction

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The name 'stars' describes the specific configurations of the reactions with three particles in the output channel, where the momenta of the reaction products are of the equal norm and thus form an equilateral triangle in the centre-of-momentum frame. If the triangle is perpendicular to the beam momentum, the configuration is called the Space Star (SST). The measurements focused on the stars have become increasingly popular after the discovery of the Space Star Anomaly (SSA) in 1989, defined as a long-lasting discrepancy between the differential cross-sections measured for SST in deuteron-nucleon breakup at 13 MeV and the corresponding theoretical predictions [1]. The effect was measured by some other groups, and it was found to diminish with increasing energy [2]. Up till now, no reliable explanation has been found.

The problem could be explored more thoroughly by expanding the available data to higher energies. To date, there have not been any systematic studies of the star configurations at energies on the order of 100 MeV. The data on deuteron-proton breakup measured with the BINA experimental setup are well-suited for such analysis. In the first stage, the data collected at the deuteron beam energy of 160 MeV were analysed. Although the Space Star configuration is out of the detector acceptance for deuteron on proton breakup, the star configurations were measured for inclination angles below 90° (so-called Forward-Plane Star and the intermediate configurations). The cross-sections for the production of the stars were measured. The data are compared with the recent theoretical calculations, including three-nucleon force and Coulomb interactions.

[1] J. Strate et al. Nucl. Phys. A 501, 51 (1989)
[2] H.R. Setze et al. Phys. Lett. B 388, 229 (1996)

Parallel Session

Few-Body Systems

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