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Asymmetric fission in heavy ion collisions

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Momentum distributions of light fragments produced in asymmetric fission in heavy ion collisions provide information on reaction dynamics and breakup mechanisms of spectator systems. At small emission angles relative to the beam direction and with high momentum resolution, energy spectra of light fragments exhibit a double-humped structure contrary to the Gaussian profile expected in usually accepted statistical approach. This effect has been seen in two experiments only [1,2]. This report presents results on the fragmentation of iron nuclei into light fragments at the energy of 230 MeV/nucleon measured in the FRAGM experiment at the TWAC heavy ion accelerator complex [1,3]. It is shown that the measured momentum spectra exhibit this effect and it is most pronounced for protons and tends to diminish for heavier fragments. Furthermore, it is demonstrated that the observation of this effect in both mentioned above experiments can be explained within the framework of certain nucleus-nucleus interaction models which take into account the Coulomb interaction.

[1] B. M. Abramov et al., EPJ Web Conf. 204, 03008 (2019) 03008. [2] P. Napolitani et al., Phys. Rev. C 70, 054607 (2004). [3] A. A. Kulikovskaya and M. A. Martemianov, Phys.Part.Nucl. 56, 1077 (2025).

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