

“ABNORMAL NUCLEAR DISPERSION” IN HEAVY ION SCATTERING: MANIFESTATION OF EXOTIC NUCLEAR EXCITATION?

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At the analysis of the rainbow elastic scattering of some light heavy ions (${}^6\text{Li} + {}^{12}\text{C}$, ${}^{12}\text{C} + {}^{12}\text{C}$, ${}^{16}\text{O} + {}^{12}\text{C}$) [1] unusual behavior of the energy dependence of volume integrals, the basic values describing absorbing and refractive abilities of nucleus-nucleus potentials, was observed. The volume integrals from the imaginary part of potential J_w exhibit a weak wide maximum at the energies 15 – 20 MeV/nucleon. Its position correlates with a non-monotonous course of the energy dependence of the volume integrals from the real part of potential J_v , which is well reproduced by the dispersion relation. Such behavior of J_w and J_v is similar to optical abnormal dispersion (steep change of the refraction index in the presence of an absorption line). The effect becomes considerably more pronounced if one considers J_w and J_v dependence not from the energy but from the relative velocity of the colliding nuclei (Fig.1). On the other hand, most projectile-target combinations (e.g., ${}^{16}\text{O} + {}^{16}\text{O}$ in Fig.1) demonstrate smooth velocity dependence (“normal dispersion”).

The very fact of the presence of the resonance velocity dependence denote to affinity of the interaction time to a certain characteristic period of internuclear movement. Its observation in rainbow scattering, i.e. under conditions of strong mutual penetration of the colliding nuclei, provides some arguments in favor of the assumption that the effect is connected with some exotic excitation of compressed nuclear matter in the interaction zone.

[1] A. A. Ogloblin *et al.*, *Yadernaya Fizika* **66**, 1523 (2003)

