PHASE SHIFT ANALYSIS OF THE $^{12}C(p,p)^{12}C$ PROCESS DIFFERENTIAL CROSS SECTIONS AT LOW ENERGIES

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Previously, at low energies and in a wide range of scattering angles, the measurement of differential cross sections (angular distributions and excitation functions) of the $p^{12}C$ elastic scattering had been made at the electrostatic tandem accelerator UKP-2-1 in the Institute of Nuclear Physics in Almaty. In this work the standard optical fitting of potentials is carried out, the phase shift analysis of the experimental data is performed and comparison of this analysis with other known results is given.

From our analysis it has been demonstrated, that at the region near the resonance it is impossible to describe the differential cross sections using only S - phase. P-wave starts to play a noticeable role, and its inclusion considerably improves the description of the experimental data. In particular, at energy $E_{p,\,lab.}$ = 457 keV, taking P-wave into account changes the value of χ^2 from 3.7 to 0.8, what has a significant effect on the quality of the differential cross sections description. At low energies $P_{1/2}$ phase goes above $P_{3/2}$, but at energy about 1.2 MeV they intersect and further $P_{3/2}$ goes above in the negative range of angles. The value of S - phase allowing for P - wave practically does not change. Taking D-wave into account in the phase analysis leads to its phase value about 1-1.5 degree in the range of energies near resonance and has almost no effect on the

behavior of the calculated differential cross sections. Furthermore, the plateau in the total cross sections of the elastic scattering is observed within the energy range $E_{p, lab.}$ = 200-300 keV, and thus, the same is observed in the S - phase of the scattering. At present, it is impossible to understand whether it results from the experimental uncertainties, unexpected errors of the phase analysis or the plateau really exists within this range of energies. To clear up this matter it is necessary to take new measurements of angular distributions at energies from 100 to 350 keV with the energy intervals about 50 keV or new measurements of excitation functions at different angles.