**DIFFERENTIAL CROSS-SECTIONS FOR ELASTIC BACKSCATTERING OF ALPHA PARTICLES BY CARBON**

T.L. Bobrovskiy1,2, M.V. Bokhovko1, A.F. Gurbich1, P.S. Prusachenko1

*1Institute for Physics and Power Engineering, Obninsk, Russia; 2*[*National Research Nuclear University MEPhI*](https://eng.mephi.ru/)*, Moscow, Russia*

E-mail: timofeybobrovskiy@gmail.com

Differential cross-sections for 12C(,0)12C scattering have been measured at the 150° and 170° angles for alpha beam energies ranging from 3.5 to 6.5 MeV. At alpha beam energies greater than ~2.2 MeV the 12C(,0)12C cross-section is non-Rutherford. For ion beam analysis of carbon, enhanced cross-sections at elevated energies provide increased sensitivity and separation of the partial spectrum of carbon against the background of heavier elements. To accurately determine the carbon content requires the use of precise cross sections at the energy and backscattering angle of interest. Since apparent discrepancies between different sets of available experimental data result in significant uncertainties in the evaluated 12C(,0)12C cross-sections [1] new measurements were undertaken followed by a revision of the current evaluation [2].

Measurements were carried out at the 3 MV tandem accelerator of IPPE with an energy step of 5–10 keV. A polished pyrolylitic graphite bulk target of a natural isotopic abundance was used in the experiment in order to avoid problems with carbon build up. The backscattering cross-sections were obtained from the measured spectra by fitting in a narrow energy window near the high energy edge of the spectrum, the cross-section being a free parameter. Fitting was performed by the COBYLA method [3] using the OLE automation technique provided by the SIMNRA-7 program [4]. The obtained results were incorporated in the data set for the cross-section evaluation performed in the framework of the R-matrix theory.

1. E.V. Gai, A.F. Gurbich, Nucl. Instr. Meth. B296, 87 (2013).
2. A.F. Gurbich, Nucl. Instr. Meth. B371, 27 (2016).
3. M.J.D. Powell, Cambridge University Technical Report DAMTP 2007.
4. M. Mayer, SIMNRA User`s guide. Tech. rep. IPP 9/113. Garching: Max-Planck-Institute fur Plasmaphysik, 1997.