Breakup studies of ^{7}Be on ^{12}C at 5 MeV/u

R. Mitra[1],* D. Gupta[1],† S. Samanta[1], K. Kundalia[1], Sk M. Ali[1],‡ S. Maity[1], Swapan K. Saha[1],§ O. Tengblad[3], A. Perea[3], I. Martel[4], J. Cederkall[5], and A. M. Moro[6]
[1]*Department of Physical Sciences, Bose Institute, Kolkata 700091, India*
[3]*Instituto de Estructura de la Materia – CSIC, Serrano 113 bis, ES-28006 Madrid, Spain*
[4]*University of Huelva, Av. Fuerzas Armadas s/n. Campus "El Carmen", 21007, Huelva, Spain*
[5]*Department of Physics, Lund University, Box 118, SE-221 00 Lund, Sweden and*
[6]*Departamento de FĂsica AtĂłmica, Molecular y Nuclear, Facultad de FĂsica, Universidad de Sevilla, Apartado 1065, E-41080 Sevilla, Spain*

Breakup reactions involving loosely bound light stable nuclei with prominent cluster structures like ^{6,7}Li have been widely studied [1–3]. Similar studies on radioactive nuclei are comparatively lesser in number due to issues of beam availability and required intensities. The light radioactive nucleus ^{7}Be has a prominent cluster structure of α and ^{3}He and it has not been studied extensively. Studies involving ^{7}Be on ^{12}C target reported very few coincidence events from breakup reaction [4]. Similar results were also reported on heavier targets like ^{58}Ni [5]. It was concluded that though ^{7}Be has a lower breakup threshold than ^{7}Li, its transfer reaction channels are more prominent than breakup [4]. To make a detailed study of the transfer and breakup channels of ^{7}Be on ^{12}C target, we carried out an experiment at HIE-ISOLDE, CERN with a 5 MeV/u ^{7}Be beam [6,7]. We report here the first exclusive breakup measurement of ^{7}Be on ^{12}C covering a wide angular range. The relevant Monte Carlo simulations were carried out with NPTool [8]. The contributions of direct and sequential breakup are distinctly identified and direct breakup is found to be dominant over sequential breakup at this energy. Detailed CDCC calculations on the breakup data are in progress. To have a better understanding of the reaction dynamics, comparison of its breakup with the mirror nucleus ^{7}Li is also being studied.

[1] A. C. Shotter *et al.*, Phys. Rev. Lett. **46**, 12 (1981)
[2] G. Baur, H. Rebel, Annu. Rev. Nucl. Part. Sci. **46**, 321 (1996)
[3] J. J. Kolata *et al.*, Eur. Phys. J. A **52**, 123 (2016)
[4] H. Amro *et al.*, Eur. Phys. J. ST **150**, 1 (2007)
[5] M. Mazzocco *et al.*, EPJ Web Conf. **163**, 00035 (2017)
[6] Sk M. Ali *et al.*, Phys. Rev. Lett. **128**, 252701 (2022)
[7] K. Kundalia *et al.*, Phys. Lett. B **833**, 137294 (2022)
[8] A. Matta *et al.*, J. Phys. G: Nucl. Part. Phys. **43**, 045113 (2016)

*Electronic address: ritankar@jcbose.ac.in
†Electronic address: dhruba@jcbose.ac.in
‡Facility of Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA
§Visiting faculty, School of Astrophysics, Presidency University, 86/1 College Street, Kolkata 700073, India