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## Investigation of breakup of $^{10}$ B by $^{209}$ Bi

Recently several exclusive breakup studies have been reported with stable weakly bound  $\alpha$  cluster nuclei like <sup>6,7</sup>Li and <sup>9</sup>Be ( $E_{th} < 2.5$  MeV). A number of interesting observations and features related to breakup of projectile/ejectile in the vicinity of target nucleus have been revealed. There are very few exclusive charged particle coincidence studies performed for the investigation of cluster structure of <sup>10</sup>B nucleus. <sup>10</sup>B nucleus can directly break into its various cluster configurations, *viz.*, <sup>6</sup>Li+ $\alpha$ ,  $\alpha+\alpha+d$ , <sup>8</sup>Be+d, and <sup>9</sup>Be+p with breakup thresholds ( $E_{th}$ ) of 4.46, 5.93, 6.03, and 6.59 MeV respectively. There can also be transfer of few nucleon(s) between target and projectile followed by the breakup of unbound/weakly bound ejectiles. In the present study we are probing the cluster structure of <sup>10</sup>B nucleus using breakup and transfer followed by breakup reactions.

The experiment was performed using <sup>10</sup>B beam of 54 MeV energy using the 14UD BARC-TIFR Pelletron-LINAC Facility, Mumbai. A self-supporting foil of <sup>209</sup>Bi of thickness  $\sim 1 \text{ mg/cm}^2$  was used as target. Double sided  $\Delta E$ -E type Silicon strip detector telescope array covering wide angular range was used for the measurement of the outgoing breakup fragments.

In the present work investigation of  $2\alpha$  coincident events in  ${}^{10}B+{}^{209}Bi$  reaction have been performed. The relative energy spectra between two  $\alpha$  particles detected in coincidence peaks at  $\sim 92$  keV that corresponds to the decay of  ${}^{8}Be$  nucleus into  $2\alpha$  particles from its ground state. It shows that most of the  $2\alpha$  coincident events are resulting from  ${}^{8}Be_{g.s.}$  decay. The tail part of  ${}^{8}Be(2^{+}, 3.03 \text{ MeV})$  was also seen in the relative energy spectra. These  $2\alpha$  coincident events may be produced in various direct breakup of  ${}^{10}B \ e.g. \ {}^{10}B^* \rightarrow {}^{8}Be+d$  or there can be transfer followed by breakup of ejectiles. The ejectile breakup modes after n, p, and d stripping reactions are:  ${}^{9}B \rightarrow \alpha + \alpha + p, {}^{9}Be^* \rightarrow \alpha + \alpha + n$  ( $E_{th}=1.57 \text{ MeV}$ ) and  ${}^{8}Be \rightarrow \alpha + \alpha$  respectively. The energy ( $E_{8_{Be}}$ ) and angle ( $\theta_{8_{Be}}$ ) of  ${}^{8}Be$  prior to the breakup into two  $\alpha$  particles were reconstructed using momentum conservation. Kinematical lines of  ${}^{8}Be$  or energy ( $E_{8_{Be}}$ )-angle ( $\theta_{8_{Be}}$ ) correlation plot indicates that transfer followed by breakup of ejectiles is a dominant mechanism for  $2\alpha$  coincident events in  ${}^{10}B+{}^{209}Bi$  reaction. Also various direct breakup modes of  ${}^{10}B$  nucleus is also being investigated. Result from both breakup and transfer followed by breakup reaction will be presented in the conference.

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