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Alpha-gamma Angular Correlation in 209Po Using TIGRESS Integrated Plunger

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Alpha decay provides a powerful tool to study structure of heavy nuclei with Z>83 (above Pb and Bi). When a gamma ray is emitted following the alpha decay, the alpha-gamma angular correlation can be used to assess the height of Coulomb and centrifugal barriers, which determine the rate of the alpha-particle tunnelling. This correlation, through the selection rules for the decays, can also be used as a tool for spin and parity assignments for the nuclear states involved in the decay. In addition, studies of alpha-gamma correlation provide a test for parity conservation in the decay processes governed by the strong and electromagnetic forces. For that reason, an apparatus to study alpha-gamma correlation has been set up at TRIUMF, Canada's National Laboratory for Particle and Nuclear Physics, through coupling of the CsI wall of the Tigress Integrated Plunger (TIP) device and TRIUMF-ISAC Gamma-Ray Escape Suppressed Spectrometer (TIGRESS). Alpha-gamma sources can be positioned at the centre of the TIP chamber, which is installed within the centre of TIGRESS. The identification of the alpha-decay is achieved through the pulse-shape sensitivity of the CsI scintillators. In this study, the sensitivity of the setup is investigated from a comparison of measured and predicted, as well as previously reported, alpha-gamma angular distribution from ^{209}Po decay. So far, time correlation of alpha and gamma decay has been imposed, and alpha identification has been applied from CsI pulse shape sensitivity. Around 8000 events with extremely high signal-to-noise ratio have been identified for further analysis under the imposed condition. Optimal angular grouping between different TIP and TIGRESS detector pairs is currently investigated. Analysis and results will be presented and discussed.

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