

Identifying particle reaction channels using CALIFA's QPID

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The R3B setup at GSI employs many different detectors to study nuclear reactions. The CALorimeter for In Flight detection of gamma rays and high energy charged pArticles (CALIFA) is a highly segmented scintillation detector surrounding the target. It is formed from CsI(Tl) crystals, with a scintillation process formed from a fast and slow component with decay times of 700ns and 3.34s respectively. The generated pulse from an incident particle is analysed by recording the charge function in a first short and then delayed large window following the trigger signal [1]. Each component is dominant in the corresponding window and the contribution of light emitted is dependent on the type of particle incident, thus analysis of this feature allows for quick particle identification (QPID).

Analysis of a recent quasi-free scattering experiment will provide insight in CALIFA's capabilities to distinguish different particle reaction channels and will help facilitate the employment of CALIFA in the future. Future experiments at R3B include measurements of p,pd QFS reaction cross sections for neutron rich carbon isotopes which will rely on CALIFA to correctly identify deuterons produced.

[1] Anna-Lena Hartig, "Evolution of CALIFA: From single detector modules to benchmark reactions", 2021

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