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Quasi-free scattering from radioactive nuclei

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Quasi Free Scattering can be understood as a process in which a high energy particle knocks a nucleon out of a nucleus without any further significant interaction between the nucleon and the incident and the outgoing particles. This reaction mechanism allows to probe both valence and deeply-bound nucleon including those leading to unbound states. QFS experiments are thus considered a quantitative tool for studying single-particle occupancies and correlation effects in the nuclei. They have been mostly exploited through direct kinematics reactions of proton beams at high energy on stable nuclear targets. The recent use of this reaction channel in inverse kinematics, opens the exciting possibility of exploring nuclear structure for unstable nuclear species. This kind of investigation is one of the physics case to be addressed with the R3B (Reactions with Relativistic Radioactive Beams) collaboration. The study of 12C(p,2p) reaction at 400 A.MeV was successfully undertaken at the present ALADIN-LAND GSI setup (predecessor of R3B) to show the feasibility of inverse kinematics QFS studies. The results obtained with this stable nucleus will be presented in this paper. These data will be completed with preliminary measurements preformed on other light exotic isotopes. The upgrade of the actual experimental setup to the final R3B/FAIR will also be presented.

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