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Quasi-Free Scattering from Relativistic Neutron-Deficient Carbon Isotopes

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Single nucleon knockout and quasi-free scattering reactions are valuable tools to study single-particle properties of nuclei [1]. Particularly, it has been argued, that they can be used to study spectroscopic factors on an absolute scale [2]. Quenching of these spectroscopic factors as compared to shell-model predictions has been observed in nuclear knockout reactions [3]. While for stable isotopes these findings are in agreement with results obtained in quasi-free electron scattering [1,4], a surprisingly large dependency of this quenching on the neutron-proton asymmetry has been observed, motivating further studies using quasi-free proton scattering.

Quasi-free scattering from the neutron-deficient carbon isotopes 10C and 11C has been studied in inverse kinematics during experiment S393 at GSI. A 40Ar beam, accelerated to 490AMeV by the SIS18 heavy ion synchrotron, was incident on a production target at the entrance of the fragment separator FRS, and the resulting cocktail beam including 10C and 11C was then transported to the R3B-LAND setup. Here, the incoming beam as well as all reaction products were detected in a kinematically complete measurement.

Results for the cross sections and associated spectroscopic factors as well as the momentum distributions of reaction products for the reactions 11C(p,2p), 11C(p,pn) and 10C(p,pn) will be shown and compared to results obtained for knockout reactions as well as calculations with distorted wave impulse approximation. Furthermore, excitation spectra of the reaction products will be discussed.

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