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Single-particle structure of ^{12}Be studied in quasi-free (p,pn)-reactions

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The neutron-rich nucleus ^{12}Be has been studied in inverse kinematics at the R^{3}B-LAND setup at GSI. In a kinematically complete measurement, proton-induced one-neutron knockout reactions at 400 MeV/nulceon are used to investigate single-particle properties.
The high neutron-to-proton asymmetry leads to the breakdown of the magic $N = 8$ shell-closure in ^{12}Be. The valence-neutron pair configuration of the ^{12}Be ground-state is assumed to be a mixture of the $(1p_{1/2})^2$ occupation and the $(2s_{1/2})^2$ & $(1d_{5/2})^2$ intruder configuration above a ^{10}Be core.[1,2]
The bound and neutron-unbound states populated in the ^{11}Be reaction fragment are disentangled by analysing the γ-ray spectrum and the relative-energy spectrum, respectively.
All three partial cross sections are determined from quasi-free scattering and coherently analysed in eikonal reaction theory by C. A. Bertulani [3].
It is shown that the $(2s_{1/2})^2$ & $(1d_{5/2})^2$ intruder configuration is the dominant ground-state admixture in ^{12}Be.

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[2] S. D. Pain *et al.*, Phys. Rev. Lett. **96**, 032502 (2006).

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