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Transfer reaction studies of neutron rich Be isotopes.

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On behalf of the MINIBALL and IS430 collaborations.

A transfer reaction experiment was performed at ISOLDE in 2010 using a 11Be beam incident on both deuterons and protons. Both one neutron transfer and scattering reactions were detected enabling study of bound states and low lying resonances in 10Be, 11Be and 12Be. The MINIBALL Ge cluster along with the T-REX Si setup were used for particle and gamma detection. The gamma detection and the difference in decay channels for the individual states enabled a complete separation of all known bound states in the three nuclei, including the 2+ and the 1- state in 10Be separated only by 1keV.
The primary target of the experiment was to investigate the mixing of the p and the sd shell in 12Be leading to the breaking of the N=8 magic number. Both 11Be and 12Be are known for the mixing of the shells leading to the inversion of states. A previous transfer reaction study of 12Be at TRIUMF showed disagreement between theoretically and experimentally determined spectroscopical factors [1]. Spectroscopical factors determined in the experiment will be presented and compared to the previously determined ones.
The differential cross sections of elastic scattering of 11Be, both (d,d) and (p,p), have shown some remarkably features, which is expected to be due to the halo structure of 11Be. The determined differential cross sections are much larger than compared to cross sections of 11B(d,d) and 10Be(d,d). The elastic cross sections will be presented and discussed along with theoretically determined cross sections calculated using FRESCO.
Resonances in 11Be and 12Be have been investigated as well. Large backgrounds have complicated the analysis of the resonances, but gamma gates have given a clear signal for the 4.5MeV resonance in 12Be. The investigation of the resonance has led to a new prediction of the spin and parity.
Finally some preliminary results of 11Be(d,Xn) reactions, using the MINIBALL as a neutron detector, will be shortly presented and discussed.

[1] R. Kanungo et al. Phys Let B682 (2010), 391-395.

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