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Single particle states in ^{67}Ni

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The interest in the structure of nuclei around ^{68}Ni has been triggered long ago by the observation of the high excitation energy of the first $2+$ in this nucleus [1]. Combining this observation with the fact that a minimum is reached in the systematic of $B(E2; 2+ \rightarrow 0+)$ -values at $N=40$ in the neutron rich nickel chain has led to interpretations in terms of a harmonic oscillator subshell closure resulting in extensive theoretical studies [2]. The excitation spectrum of odd mass nuclei in the direct neighborhood of closed shells is usually governed by single particle excitations. One-neutron transfer reactions are a useful tool to fix spins and parities of excited states and determine spectroscopic factors which can be compared to shell model predictions. Recent large scale shell model calculations have shown the sensitivity of certain nuclear parameters in this region to the size of the $N=40$ and $N=50$ shell gaps [3]. By measuring effective single-particle energies these shell gaps can be fixed in order to further update the existing nuclear models.

In this case the excitation spectrum of ^{67}Ni was studied by performing the $^{66}\text{Ni}(d,p)^{67}\text{Ni}$ reaction in inverse kinematics with an energy of 3 MeV/u at the REX-ISOLDE radioactive ion beam facility in CERN using the MINIBALL setup in combination with the T-REX particle detection array [3]. The extracted angular distributions of the protons can be compared to DWBA calculations in order to determine spin and parity of the excited states as well as spectroscopic factors. Population of levels with excitation energy up to 6 MeV have been observed, probably above $N=50$.

Preliminary results of the analysis will be presented.

[1] R. Broda et al. Phys.Lett.B 113, 279 (1982)

[2] O. Sorlin et al. Phys.Rev.Lett. 88, 092501 (2002)

[3] K. Langanke et al. Phys.Rev.C 67, 044314 (2003)

[4] V. Bildstein et al. Prog.Part.Nucl.Phys 59, 386 (2007)

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no

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