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np pairing in N=Z nuclei studied through 2N transfer reactions

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Pairing in exotic nuclei is a subject of active research in nuclear physics. Of particular interest is the competition between isovector (T=1) and isoscalar (T=0) Cooper pairs, expected to occur in N=Z nuclei .

Near 40Ca and 56Ni, earlier systematic analyses of two-neutron (L=0) transfer reactions [1,2] found the data consistent with a picture involving configuration mixing induced by simple pairing degrees of freedom of the valence neutrons. While providing evidence for isovector pairing in the form of pairing vibrations [2,3], the question of whether the isoscalar component generates collective modes is still an open one.

Direct reactions involving the transfer of an np pair from even-even to the low lying 0+,1+ states in odd-odd self conjugate nuclei could be excellent probes to study np correlations. While absolute cross-section values are always desirable, we note that the ratio $\sigma(0+)/\sigma(1+)$ itself provides an almost model independent measure of the pairing collectivity in the respective channels. Thus, the (3He,p) reaction stands out as an ideal tool to study np correlations.

Following a short overview of the subject, we will discuss a series of experiments carried out at the Argonne ATLAS facility to study the (3He,p) reaction in reverse kinematics and present results obtained with a beam of 44Ti [4].

We will also speculate on the use of np knockout reactions and conclude by delineating a possible path as we move towards the next generation of rare isotopes facilities.

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Summary

Co-author(s) : MACCHIAVELLI, Augusto (Lawrence Berkeley National Laboratory)

Presenter(s) : MACCHIAVELLI, Augusto (Lawrence Berkeley National Laboratory)

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