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Neutron-proton pairing in a single j-shell and the ground state spin[1] A.O. MACCHIAVELLI, P. FALLON, Lawrence Berkeley National Laboratory, P. VAN ISACKER, GANIL — Pairing in exotic nuclei is a subject of active research in nuclear physics. Of particular interest is the competition between standard isovector (T=0, J=0^+) and isoscalar (T=0, J=1^+) Cooper pairs, expected to occur only near N=Z nuclei. In this work we present the results of the shell model study of a single-j shell with nucleons interacting via a schematic two-body force of the form V_{JT}(x) = (1-x)Vδ_{J1} + x Vδ_{J0} that simulates the competition of these two types of pairing with the control parameter x varying from pure isoscalar (x=0) to pure isovector (x=1). We find that for x $\leq$ 0.4 the ground state of the many body system with A particles is no longer that with spin 0^+, but rather one that corresponds to an aligned state of A/2 quasi-deuterons with spin (A/2)* 1^+ . We can show in the framework of the SO(8) model that this intriguing phenomenon appears as a consequence of the spin-orbit splitting. Since this transition is not seen in nuclei, we can set some limits to the relative strength of these forces. Furthermore, we can speculate about possible implications in atomic fermions traps where, in principle, the control parameter x can be varied.

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