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Ground-state configuration of neutron-rich 35 Al via Coulomb breakup

The ground-state configuration of 35Al has been studied via Coulomb dissociation
(CD) [1] using the LAND-FRS setup (GSI, Darmstadt) at a relativistic energy of ~403 MeV/nucleon. The measured inclusive differential CD cross section for
35Al, integrated up to 5.0 MeV relative energy between the 34Al core and the neutron using a Pb target, is 78(13) mb [2].The exclusive measured CD cross section that populates various excited states of 34Al is 29(7) mb. The differential CD cross section of 35Al ⟶ 34Al + n has been interpreted in the light of a direct breakup model, and it suggests that the possible ground-state spin and parity of 35Al could be, tentatively, 1/2+ or 3/2+ or 5/2+. The valence neutrons, in the ground state of 35Al, may
occupy a combination of either l = 3,0 or l = 1,2 orbitals coupled with the
34Al core in the ground
and isomeric state(s), respectively. This hints of a particle-hole configuration of the neutron
across the magic shell gaps at N = 20,28 which suggests narrowing the magic shell gap. If the 5/2+
is the ground-state spin-parity of
35
Al as suggested in the literature, then the major ground-
state configuration of
35Al is a combination of
34Al(g.s.; 4−) ⊗ νp3/2 and 34Al(isomer; 1+) ⊗ νd3/2
states. The result from this experiment [2] has been compared with that from a previous knockout measurement [3] and a calculation using the SDPF-M interaction.

References:
1. U. D. Pramanik et al., Phys. Lett. B 551, 63 (2003).
2. S. Chakraborty et al., Phys. Rev. C 96, 034301 (2017).
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