1n-removal reactions around N=20 shell closure

C. Nociforo[1], A. Prochazka[1,2], R. Kanungo[3], B. A. Brown[4], T. Aumann[1], D. Boutin[2], D. Cortina-Gil[5], B. Davids[6], M. Diakaki[7], F. Farinon[1,2], H. Geissel[1], R. Gernhäuser[8], J. Gerl[1], R. Janik[9], B. Jonson[10], B. Kindler[1], R. Knöbel[1,2], R. Krücken[8], M. Lantz[10], H. Lenske[2], Yu.A. Litvinov[1], K. Mahata[1], P. Maeirbeck[8], A. Musumarra[11,12], T. Nilsson[10], T. Otsuka[13], C. Perro[3], C. Scheidenberger[1,2], B. Sitar[9], P. Strmen[9], B. Sun[2], I. Szarka[9], I. Tanihata[14], Y. Utsuno[15], H. Weick[1], M. Winkler[1].

[1]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany
[2]Justus-Liebig University, Gießen, Germany
[3]Astronomy and Physics Department, Saint Mary's University, Halifax, Canada
[4]NSCL, Michigan state University, East Lansing, USA
[5]Universidad de Santiago de Compostela, Santiago de Compostella, Spain
[6]TRIUMF, Vancouver, Canada
[7]National Technical University, Athens, Greece
[8]Physik Department E12, Technische Universität München, Garching, Germany
[9]Faculty of Mathematics and Physics, Comenius University, Bratislava, Slovakia
[10]Fundamental Physics, Chalmers University of Technology, Göteborg, Sweden
[11]Università di Catania, Catania, Italy
[12]INFN-Laboratori Nazionali del Sud, Catania, Italy
[13]Center for Nuclear Study, University of Tokyo, Saitama, Japan
[14]Research Center for Nuclear Physics, Osaka, Japan
[15]Japan Atomic Energy Agency, Tokai, Ibaraki, Japan.

The evolution of the configuration mixing in the ground state of the pf shell Al isotopes as a function of the neutron number have been studied through the longitudinal momentum distribution analysis of the residues in 1n-removal reactions at relativistic energies. The experiment [1] was performed by using radioactive ion beams produced in-flight at the Fragment Separator (FRS) of GSI in order to investigate a wide region of the nuclear chart overlapping with the so called Island of Inversion, around N=20. The new data presented here have been described within an eikonal model. Their interpretation will be discussed comparing the results of theoretical calculations in the sd-shell and sdpf-shell model spaces. Concerning the odd-mass Al isotopes (N=20,22), dominated by the unpaired $d_{5/2}$ proton, an influence of core polarization effects as a function of the neutron number is expected. For the even mass Al (N=21,23), information on the occupied orbital of the unpaired neutron can be extracted on the basis of shell model predictions.

[1] R. Kanungo, et al. Phys, Lett. **B685**, 253(2010).