

## A Particle-Rotor Model Description of $^{29}\text{F}$ \*

Recent results from RIKEN/RIBF on the low-lying level structure of  $^{29}\text{F}$ , and state of the art Shell Model calculations using the SDPF-M effective interaction [1], suggest the extension of the N=20 Island of Inversion to the Z=9 Fluorine isotopes.

In this work we discuss the low-lying excitation spectrum of  $^{29}\text{F}$  in terms of a collective picture [2], with a level structure corresponding to the rotation-aligned coupling limit of the Particle Rotor Model (PRM) [3].

The Coriolis coupling effects on the proton  $d_{5/2}$  Nilsson multiplet give rise to a (favored) decoupled band, with its  $5/2+$  bandhead naturally emerging as the ground state. The first excited state corresponds to the anti-aligned  $1/2+$  configuration at an energy that depends directly on the core  $E(2+)$ .

We find a consistent solution at a deformation of  $\epsilon \sim 0.17$ , corresponding to an excitation energy of the  $2+$  in  $^{28}\text{O}$  at  $\sim 2.4$  MeV, in line with the conclusions reached in Ref. [1].

PRM predictions for some spectroscopic observables will also be presented and discussed in the context of a Coulomb Excitation experiment approved at RIKEN [4]. If similar energetics and coupling conditions persist, a  $\pi d_{5/2} \times \nu f_{7/2}$  double-decoupled structure in  $^{30}\text{F}$  is predicted with a  $6-$  ground state.

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[1] P. Doornenbal, et al., Phys. Rev. C95, 041301(R) (2017).

[2] A. O. Macchiavelli, et al., Phys. Lett. B775, 160 (2017).

[3] F. S. Stephens, Rev. Mod. Physics, 47, 43 (1975).

[4] H. L. Crawford, et al., RIBF164 proposal (2017).

### Summary

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