

# Three-Body Models of Exotic Nuclei and Molecular States in Light Nuclei

**Lorenzo Fortunato**<sup>1,2</sup>

<sup>1</sup>Dip. Fisica e Astronomia “G. Galilei”, Univ. Padova (Italy),  
v.Marzolo, 8 , I-35131 Padova (Italy)

<sup>2</sup>I.N.F.N. Sez. Padova, Padova (Italy)

In recent year, we have developed and investigated several exotic nuclei with three-body models including nucleon-nucleon correlations with the aim of studying measurable properties like radii and the electric dipole response. We have applied our models to neutron-rich fluorine isotopes [1–3], and in particular to  $^{29}\text{F}$ , that was found to sit at the borders of the island of inversion. We refined our models and proposed that is a moderate two-neutron halo nucleus with enhanced  $B(E1)$  response to the continuum. These result help interpret recent data on this isotope. By extending our models to  $^{31}\text{F}$  as in Ref. [4], we found a large spatial extension due to mixing of p-components in the neutron wavefunction and enhanced  $B(E1)$  response, pointing to a halo structure in this nucleus too.

We have also investigated unstable systems with core plus p-n structure [5], like  $^{102}\text{Sb}$ , i.e. a  $^{100}\text{Sn}$  core plus a deuteron, finding that it is a probable one-proton emitter due to the weakening of the p-n correlations with respect to the bare deuteron. We suggested that the observation of resonant state and decay might provide crucial benchmarks for this type of systems.

If time allows, I will also briefly present some results coming from the application of discrete group symmetries to light clusterized nuclei.

## References

- [1] L. Fortunato, J. Casal, W. Horiuchi, Jagjit Singh, A. Vitturi, *Commun. Phys.* **3** (2020) 132.
- [2] J. Singh, J. Casal, W. Horiuchi, L. Fortunato. A. Vitturi, *Phys. Rev. C* **101** (2020) 024310.
- [3] J. Casal, Jagjit Singh, L. Fortunato, W. Horiuchi, A. Vitturi, *Phys. Rev. C* **102** (2020) 064627.
- [4] G. Singh, Jagjit Singh, J. Casal, L. Fortunato, *Phys. Rev. C* **105** (2022) 014328.
- [5] T. Oishi, M. Kimura, L. Fortunato, *Phys. Rev. C* **111** (2026) 034307.