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Recent advances from ab initio Self-Consistent Green's function computations of nuclei

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Many-body Green's functions stands out among microscopic theories for its capability to encapsulate infromation on ground state properties, response and single particle spectroscopy within the same framework. Different aspects of the many-body correlations and dynamics of a given nucleus can then be investigated simultaneously with the same microscopic approach.

The first part of the talk will focuss on ongoing work to extend self-consistent Green's function (SCGF) theory to descericbe pairing effects in the presence of collective excitations–the so called Gorkov-ADC(3) framework[1]–and the exploitation of diagrammatic Monte Carlo methods [2] for devising first principle optical potentials [3].

The second part of the talk will cover recent results regarding the structure near the Ar and Ca isotopic chains. In particlar, I will further discuss the analysis of a recent GANIL experiment that provided evidence for a charge bubble in ^{46}Ar and linked this to an atypical shell closure at Z=18 and N=28 [4].

[1] C. Barbieri, T. Duguet and V. Somà, Phys. rev. C **105**, 044330 (2022).
[2] S. Brolli, C. Barbieri and E. Vigezzi, Phys. Rev. Lett. **134**, 182502 (2025).
[3] A. Idini, C. Barbieri and P. Navrátil, Phys. Rev. Lett. **123**, 092501 (2019).
[4] D. Brugnara et al., *in preparation.*

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