Université Paris-Saclay
IJCLab
(Laboratoire de Physique des 2 Infinis Irène Joliot-Curie)
Bât. 100, F-91405 Orsay

Séminaire de Physique Nucléaire Théorique

Spectroscopy of even-even open-shell nuclei via self-consistent Gorkov-Green's function calculations

Gianluca Stellin
(IJCLab)

The fundamentals of the *ab-initio* Self-Consistent Gorkov Green's function (SCGGF) [1-2] approach for the investigation of low-lying energy spectrum of the semi-magic even-even nuclei are presented. In the last decade, the SCGGF method has brought a significant renewal in the realm of ab-initio approaches to nuclear structure, marking a step forward in the knowledge of bulk nuclear properties of even-even nuclei, such as the ones lying along the Ar-Cr [3-4] isotopic chains. The access to the one-particle propagator has allowed the study of ground and excited states of neighbouring odd-A isotopes [5-6]. Nonetheless, the prediction of excited energy levels and reduced electric and magnetic multipole transition probabilities calls for the introduction of the polarization propagator, previously not embedded in the $\mathrm{U}(1)_Z \times \mathrm{U}(1)_N$ symmetry breaking formalism. In quantum chemistry, present-day approaches for the description of the spectrum of medium-sized organic molecules [7-8] are based on diagrammatic many-body Green's function theory applied to the polarization propagator at third order in the *algebraic diagrammatic construction* (ADC) approach [9-13]. Another return of this is study will be provided by the prediction of new shell closures in neutron-rich even-even nuclei, identified through the local maxima in the energy of the 2_1^+ state and in the related electric quadrupole transition probability, $B(E2, 0_1^+ \to 2_1^+)$ [14].

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