PAIRING FLUCTUATIONS INFLUENCE ON BEYOND MEAND FIELD THEORIES.

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Estructura Nuclear.

Self-consistent mean field approaches with effective phenomenological interactions have succeed in describing many bulk properties along the whole nuclear chart. This success is closely related to the spontaneous symmetry breaking mechanism that allows the inclusion of many correlations within a very simple intrinsic product wave function. However, in some cases this picture fails in taking into account important correlations and methods beyond the mean field approach have to applied.

In this contribution I will show some recent results obtained with the Gogny interaction applying methods beyond mean field that include particle number and rotational symmetry restoration plus configuration mixing within generating coordinate method (GCM) framework.

In particular, we have applied these methods to study for the first time quadrupole deformation and pairing fluctuations at the same foot. I will discuss the influence of these degrees of freedom on the resulting nuclear structure, analyzing the spectroscopic properties of N=30, 32, 34 Calcium, Titanium and Chromium neutron rich nuclei where possible shell closures at N=32 and 34 have been expected both experimental and theoretically.

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