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Shape Coexistence in the Neutron-Deficient 188Hg Isotope

Shape coexistence is a characteristic phenomenon of finite many-body quantum systems where different nuclear shapes coexist within the typical energy range of nuclear excitations.
The principle behind this phenomenon is the contrast between two different tendencies: on one hand valence nucleons and np-nh excitations driving the nucleus to collective configurations; on the other hand, pair forces and shell effects leading to a spherical shape [1].
Shape coexistence is significantly present in the neutron-deficient isotopes around Z = 82, in particular in light isotopes of Hg.
From the systematics of the mercury isotopes, ^{188}Hg is expected to be the heaviest isotope where two different shapes coexist.
However, information on the electromagnetic properties of low-lying states is scarce or absent for ^{188}Hg.
For these reasons, an investigation of ^{188}Hg is of great interest for a better comprehension of shape coexistence in this region.
In order to shed light on the features of such phenomenon in the neutron-deficient Hg nuclei, an experiment was performed at the Laboratori Nazionali di Legnaro, employing GALILEO, a HPGe detectors array, coupled with Neutron Wall and with the dedicated plunger.
The ^{188}Hg nucleus was populated via a fusion-evaporation reaction and the lifetime of its low-lying states was measured with Recoil Distance Doppler-Shift (RDDS) method for the first time [2].
In the contribution, the preliminary results on the lifetime of the low-lying states will be presented together with their comparison to state of the art symmetry-conserving configuration-mixing calculations [3].
This establishes the presence of shape coexistence in the nucleus providing a new interpretation of the nuclear structure of ^{188}Hg.

[1] K. Heyde, J. L. Wood, Rev. Mod. Phys. 83, (2011)
[2] A. Dewald et al., Prog. Part. Nucl. Phys. 67, (2012)
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