ID de résumé : **39**

# Shape coexistence and E0 transitions in neutron-deficient Hg isotopes studied through Coulomb excitation

## Contenu

The neutron-deficient mercury isotopes around mid-shell point for neutrons (N=104) represent one of the most prominent examples of shape coexistence known so far [1]. This region has been extensively studied using various experimental techniques, such as laser spectroscopy [2,3], decay spectroscopy studies [4,5], lifetime measurements [10-12] and Coulomb excitations [6,7]. These studies point to the coexistence of two classes of states with strong mixing between the low-lying members at Hg-182,184 [1,5-7,12]. Especially, the presence of strong E0 components in the I⟶I(I≠0) transitions is interpreted as a fingerprint for mixing [1].

In order to probe the properties of yrast and non-yrast states of the exotic even-even $^{182-188}$Hg isotopes Coulomb excitation experiments were performed at REX-ISOLDE facility at CERN. Reduced E2 matrix elements coupling lowest-lying states in the mercury isotopes were extracted for the first time, including their relative signs. These are a sensitive probe of shape coexistence and may be used to validate various nuclear models. Moreover, the analysis of the intense K X-ray peaks measured for $^{182,184}$Hg revealed that the $2_2^+ \rightarrow 2_1^+$ transitions are strongly converted yielding prominent E0 transitions. This observation was supported by the large relevant conversion coefficients inferred from the $\beta^+$/EC decay of $^{182,184}$Tl [5,9].

In the presentation the experimental results will be shown and discussed in terms of mixing of two different configurations along with the comparison with various theoretical model predictions: the Beyond Mean Field model, the Interacting Boson Model with configuration mixing and the General Bohr Hamiltonian [7].

A detailed studies on shape coexistence in the neutron deficient Hg isotopes will be continued using higher beam energies at HIE-ISOLDE. In view of the most recent experimental and theoretical achievements obtained in the scope of the Hg charge radii measurements [2,3] the Coulomb excitation studies will be for the first time performed for the odd-mass $^{185}$Hg. These measurements will benefit from: (i) the use of the electron spectrometer SPEDE [8] which will provide direct information on intensities of conversion electrons; (ii) recently performed measurements of the $\beta^+$/EC decay of $^{182;184;186}$Tl with the ISOLDE Decay Station (IDS) which yielding precise, complementary spectroscopic data in the Hg isotopes [9]. An overview of the future Coulomb excitation campaign in the neutron deficient Hg-Pb region at HIE-ISOLDE will be given.

[1] K. Heyde, J.L. Wood, Rev. Mod. Phys83, 1467 (2011).
[2] B.A. Marsh et al., Nature Physics 14, 1163 (2018).
[3] S. Sels et al., Phys. Rev. C 99, 044306 (2019).
[4] J. Wauterset al., Phys. Rev. C 50, 2768 (1994).
[5] E. Rapisarda et al., J. Phys. G 44, 074001 (2017).
[6] N. Bree et al., Phys. Rev. Lett112, 162701 (2014).
[7] K. Wrzosek-Lipskaet al.,Eur. Phys. J. A 55, 130 (2019).
[8] P. Papadakis et al., Eur. Phys. J. A 54, 42 (2018).
[9] M. Stryjczyk, PhD thesis KU Leuven '' Shape coexistence in the nickel (Z=28) and mercury (Z=80) regions probed through decay studies''
[10] T. Grahn, et al., Phys. Rev. C 80, 014324 (2009).
[11] M. Scheck, et al., Phys. Rev. C 81, 014310 (2010).
[12] L. P. Gaffney, et al., Phys. Rev. C 89, 024307 (2014).

**Auteur principal:** WRZOSEK-LIPSKA, Katarzyna

**Orateur:** WRZOSEK-LIPSKA, Katarzyna

**Commentaires:**

on behalf of the IS452 and IS563 collaborations

Déposé par **WRZOSEK-LIPSKA, Katarzyna** le **lundi 4 avril 2022**