Contribution ID: **52** Type: **not specified**

Evolution of collectivity in even-even platinum nuclei from fast-timing measurements with LaBr3 detectors

Thursday, July 25, 2024 2:15 PM (20 minutes)

The even-even platinum isotopes from A = 190 − 198 are stable and have well-established B(E2,2+1 ⟶ 0+1) and derived τ(2+1) values measured via Coulomb excitation. These tran- sitional isotopes are gamma soft and show some evidence of triaxiality, exhibiting low-lying γ bands built on 2+2 states. In contrast, the mid-shell isotopes exhibit shape-coexistence, having level structures consistent with theoretical models that predict prolate-deformed 0+1 ground states and oblate-deformed excited 0+2 states. The transition from triaxiality to the shape-coexisting picture is complex and measurements of 2+1 state lifetimes would pro- vide valuable insight into the evolution of collectivity. Unfortunately, there is considerable disagreement between the most recent 2+1 lifetime evaluations for the A = 180−186 nuclei from ENSDF (using both e−γ coincidence and recoil-distance methods) and more recent measurements based on a mixture of recoil-distance and γγ-fast timing measurements.

We will report the results of τ(2+1) measurements for even-even platinum nuclei that were undertaken at the Heavy Ion Accelerator Facility at the Australian National Uni- versity using LaBr3 detectors and γγ-fast timing methods. We confirm the validity of our methodology by comparison of the new result for τ(2+1) in 190Pt with the well- established value from Coulomb excitation. Further measurements under similar con- ditions for 180−190Pt have been made using a range of reactions involving 28,30Si beams on a 156Gd target and 16,18O beams on 172,174,176Yb targets.

A key result is an ≈ 30% increase of τ(2+1) for 188Pt as compared to the ENSDF evaluation, while new results for lighter isotopes now resolve existing discrepancies, es- tablish smooth trends with mass number, and are in agreement with other properties such as changes in the average nuclear charge radii determined from laser spectroscopy. The new measurements establish that triaxial behaviour extends down to 188Pt, with a change to nominally prolate ground states (albeit mixed due to prolate-oblate shape co- existence) occurring at 186Pt.

We will present new General Collective Model calculations that result from fits to experimental data with 8 free parameters in the Hamiltonian, as well as calculations with the General Bohr Hamiltonian where the potential energy and mass parameters were obtained from the microscopic mean-field produced with both Skyrme SIII/SLy4 interactions and UNEDF0/UNEDF1 density functionals. The energy surfaces from the GCM and GBH approaches show features consistent with experimental observations and the new interpretation of the shape evolution.

This work is supported by Australian Research Council Grant DP210101201 and the In- ternational Technology Center Pacific (ITC-PAC) under Contract No. FA520919PA138. Support for the Heavy Ion Accelerator Facility operations through the Australian National Collaborative Research Infrastructure Strategy is acknowledged.

Presenter: LANE, Gregory (The Australian National University)

Session Classification: A Mixed Session: Theory & Reactions & Structure