Evolution of collectivity in the vicinity on ^{208}Pb: Preliminary results*

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Knowledge on the spectroscopic data of nuclei in the region of ^{208}Pb provides key information to probe parameter sets of nuclear models, both shell-model and mean-field based. It also serves as a basis for the extrapolation of any nuclear model into the area of actinides and super-heavy nuclei. Since ^{208}Pb is the heaviest doubly-magic nucleus known to date, it is also the last firm anchor point for extrapolations. Within the PreSPEC-AGATA campaign at GSI [1], fragmentation of a ^{208}Pb beam at 1GeV/u on a 2.5 g/cm^2 Be target was performed to study Pb, Hg and Pt isotopes. Charge and mass-to-charge ratio of the incoming particles were obtained in an event-by-event basis using the standard FRS detectors [2]. Figure 1 shows the identification plot obtained for the reference isotope ^{206}Pb. The reduced Z resolution observed is due to the creation of charge states during the passage of the heavy ions through the ionization chambers and other material in the S4 area. The solid line, containing 73% of the events, indicates the gate used to select the isotope of interest and to avoid background events. Incoming particles were focused in a 400 mg/cm^2 thick Au target to perform relativistic Coulomb excitation. Particle identification after the target was obtained by combining the measurements of energy loss and total kinetic energy in the LYCCA calorimeter [3] as shown in Figure 2. The solid line indicates the gate used to select Pb ions. γ rays emitted after the reaction were detected using the AGATA [4] array. Gates on particle-γ time, scattering angle and crystal multiplicity were applied to observe the decay of the target nuclei after Coulomb excitation. Figure 3 shows the energy spectrum obtained using an 10 ns time gate, a scattering angle between 2 mrad and 20 mrad and crystal multiplicity lower than 4. The observed peak at 547.5 keV comes from the $7/2^+ \rightarrow 3/2^+$ transition in Au. The total number of counts observed for this transition is 66(31). Changes on gates used, as well as background subtraction will be performed to increase the statistics and to improve the peak-to-total ratio. Doppler correction will be performed to obtain the projectile de-excitation γ peak.

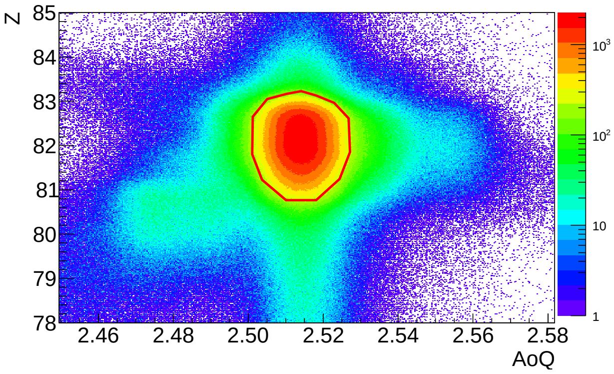

Figure 1: Incoming particle identification: AoQ vs Z as measured in the FRS

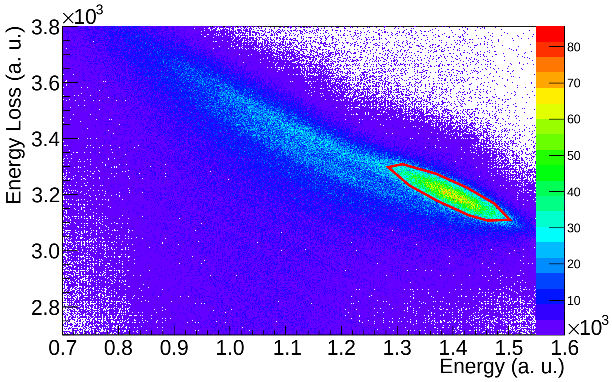

Figure 2: Outgoing particle identification: Total kinetic energy vs. Energy loss in the LYCCA calorimeter

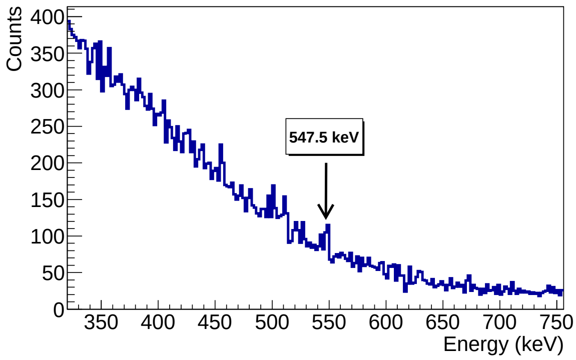

Figure 3: Energy spectrum measured by AGATA showing the 547.5 keV $7/2^+ \rightarrow 3/2^+$ transition in Au.

References

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