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Projectile fragmentation experiments in PreSPEC AGATA's S429: insight to exotic-nuclei production mechanisms via isomeric ratios

In the years 2012{2014 the pan-European Advanced GAmma-ray Tracking Array (AGATA) was placed at the German accelerator research centre GSI Darmstadt. Within the PreSPEC collaboration [1], AGATA was used to perform high-resolution
-ray spectroscopy of relativistic radioactive
ions to obtain unique nuclear structure information of exotic nuclei far away from the line of stability.
This contribution focuses on an experiment where the fragmentation of a 208Pb primary beam was used to populate even-mass nuclei around 208Pb. The principal aim was to study the aforementioned neutron-rich even-mass nuclei via Coulomb excitation. Prior to that, however, measurements with stopped beams were necessary for two reasons: rstly, when measuring E2 transition strengths it is mandatory to determine the isomeric composition of the beam via isomeric ratios. Secondly, isomeric ratios are the main ingredient for understanding the population of excited states in nuclei produced via relativistic fragmentation reactions.
In the course of the analysis, we used all AGATA-tailored algorithms [2] relying on the characterisation and an established consolidated treatment of the data based on the procedures outlined in Ref. [3]. Projectile-like fragments were selected and identied with the FRagment Separator. They were then implanted in a passive stopper so that these implantation events could be correlated with delayed
rays. From their yields, isomeric ratios are derived [5]. These ndings were compared
with theoretical predictions and provide a valuable input for nuclear reaction theories.
Recent results from another AGATA-PreSPEC experiment report that the reaction mechanism responsible for population of an isomeric state can involve resonances [4], especially when only few nucleons are removed. We suggest a similar approach to be utilized in the interpretation of the production of excited states when removing few nucleons from the 208Pb primary beam.
Besides the experiment presented here, such a systematic assessment of isomeric decays is viable for both other experiments within the campaign with a primary 238U beam as well as the upcoming PreSPEC stopped-beam campaign.

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[3] N. Lalovic et al., Nucl. Instr. Meth. A 806, 258. (2016).
[4] Zs. Podolyak et al., Phys. Rev. Lett. 177, 222302. (2016).
[5] N. Lalovic et al., to be submitted to J. Phys. G: Nucl. Part. Phys. (2017).

Primary author: LALOVIC, Natasa (Lund University)

Presenter: LALOVIC, Natasa (Lund University)