

Nuclear moments in projectile fragmentation. Lessons from the past with a sight to the future.

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The nuclear electromagnetic moments provide an essential insight into the structure of the nuclei. They are of special interest for exotic regions in the nuclear chart where new shell effects or rapid modifications of the nuclear structure could be expected. The magnetic dipole moments provide a fingerprint of the single-particle properties of the nuclear wave function while the electric quadrupole moment can offer the closest view towards the nuclear deformation.

The scarce production of the nuclei far from stability makes them especially challenging for nuclear moments studies. This is even more true for short-lived (microsecond) isomeric states. Methods for obtaining spin-oriented ensemble for nuclei produced in projectile fragmentation reactions have been developed over the last three decades and successfully applied in a number of laboratories. Some examples of TDPAD measurements will be presented and the lessons learned over the last 25+ years will be discussed. The preliminary results from a recent experiment at RIKEN will be mentioned and put in the context of future studies as for example at g-SPEC at FAIR.

Ideas for accessing even shorter-lived (nanosecond) excited states will be presented and the advantages of performing those measurements at fragmentation facilities will be discussed.

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