

Exploring Nuclear Astrophysics using Heavy-Ion Storage Rings

Storage rings are powerful tools for conducting precision experiments with both stored highly-charged stable and radioactive ions in the realm of nuclear structure and astrophysics. The storage rings at GSI Helmholtz Center in Darmstadt, Germany, namely, the heavy-ion storage ring - Experimental Storage Ring (ESR), and the low energy storage ring - CRYRING provide unique possibilities to enable the most efficient use of rare ion species. In this talk, the primary focus will be on recent key experiments from the FAIR-Phase 0 research program conducted at the ESR and CRYRING.

Firstly, the first-ever direct measurement of the bound-state beta decay of fully-ionized $^{205}\text{Tl}^{81+}$ ions will be reported. After almost three decades since its proposal, the measurement was successfully performed in the ESR, employing the entire accelerator chain at GSI. Secondly, I will provide an update on the current status of the nuclear astrophysics program at CRYRING utilizing the new detector system, CRYRING Array for Reaction Measurements (CARME). Furthermore, I will provide an overview of upcoming storage ring projects on a global scale, offering insights into the broader context of advancements in this field.

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