

Systematic measurement of electron capture cross sections in the low collision energy regime

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We propose a systematic measurement of electron capture cross sections for heavy, bare ions at projectile energies below 5.5 MeV/u at different parameters, namely the projectile charge number, the collision energy and the target charge number. The measurement will be realized by introducing a novel internal target station setup to the CRYRING@ESR. The required diagnostic tools will be three semiconductor x-ray detectors, placed at the interaction chamber equipped with beryllium windows, and a channel electron multiplier for the detection of the down-charged projectile ions.

In order to reproduce previous results obtained at the ESR (as a reference measurement) we request a bare Xe54+ beam at an energy of 5.5 MeV/u and a hydrogen target. The number of stored ions should be in the order of 10E6 particles. After performing this initial measurement as a benchmark, we plan a systematic measurement of the electron capture cross sections at lower energies (down to 3 MeV/u), different projectile ions (U92+) and target species (nitrogen). According to our experience to date, NRC is expected to be the dominating process towards lower ion energies and higher target nuclear charges. Overall, the goal is to provide accurate experimental data in the up to now unexplored low-energy region of the CRYRING@ESR for the refinement of the theoretical electron capture models.

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