

1s Lamb shift in high-Z ions: recent results from the FOCAL collaboration

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High precision x-ray spectroscopy of heavy highly charged ions provides an excellent tool for a test of the most advanced theories describing the atomic structure in the regime of extreme field strengths. These theories take into account quantum electrodynamic (QED) corrections of higher orders and the structure of the atomic nucleus. In this contribution, we present the experiment where the Lyman- α and - β transitions in hydrogen-like gold (Au78+) were measured for the first time with a high-resolution twin crystal spectrometer FOCAL [1] at the GSI Helmholtz Centre for Heavy Ion Research in Darmstadt, Germany. The measurement was carried out at the experimental storage ring (ESR) by colliding initially bare Au ions with an argon gas target at a velocity of 0.47 c, where c denotes the velocity of light. After single-electron capture into an excited state of the projectile ion, radiation is emitted by a decay cascade into the ground state of the ion, part of which is Bragg-reflected on a curved Si crystal in Laue configuration and finally detected by a 2D position sensitive germanium detector.

References

[1] Beyer H. F. et al., Spectrochimica Acta B 64, 736 (2009)

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