Dielectronic Recombination In Active Galactic Nuclei

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Abstract

XMM-Newton and Chandra observations of active galactic nuclei show a rich spectrum of X-ray absorption lines. These observations have detected a broad unresolved transition array (UTA) between ≈ 15-17 Å. This is attributed to inner-shell photoexcitation of M-shell iron ions. Modelling these UTA features is currently limited by uncertainties in the low temperature dielectronic recombination (DR) data for M-shell iron. In order to resolve this issue and to provide reliable iron M-shell DR data for plasma modeling, we are carrying out a series of laboratory measurements using the heavy-ion Test Storage Ring at the Max-Planck-Institute for Nuclear Physics in Heidelberg, Germany. Storage rings are currently the only laboratory method capable of studying low temperature DR. We use our results to produce experimentally-derived DR rate coefficients. We are also providing our data to atomic theorist to benchmark their DR calculations. Here we will report our recent DR results for selected Fe M-shell ions. At temperatures where these ions are predicted to form in photoionized gas, we find a significant discrepancy between our experimental results and previously recommended DR rate coefficients.

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