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Improving absolute electron impact excitation cross sections for X-ray astrophysics through laboratory measurements[1] NATALIE HELL, G. V. BROWN, P. BEIERSDORFER, Lawrence Livermore Natl Lab, R. L. KELLEY, C. A. KILBOURNE, M. LEUTENEGGER, F. S. PORTER, NASA GSFC, J. WILMS, Dr. Remeis-Sternwarte ECAP, Universitt Erlangen-Nrnberg — Recently, the calorimeter SXS onboard the Hitomi X-ray observatory has provided the first high-resolution spectrum of a celestial source - the Perseus galaxy cluster - in the 6 keV spectral region containing signatures of K-shell transitions of Fe group elements. At 5 eV resolution, these spectra have unveiled some short-comings of the plasma models and underlying atomic databases commonly used for spectral analysis in X-ray astrophysics. For such high-quality data as the Hitomi Perseus spectrum, the accuracy of plasma diagnostics, in some cases, is thus no longer limited by instrumental performance, but by the accuracy and completeness of the available atomic physics reference data. In coronal plasmas like the intergalactic medium in galaxy clusters, electron impact excitation (EIE) is an important level population mechanism and strongly influences the line ratios in these spectra. To benchmark and improve the available reference data, we used the EBIT Calorimeter Spectrometer, a calorimeter similar to the SXS, at the LLNL electron beam ion trap EBIT-I to measure absolute EIE cross sections for K-shell transitions in highly charged Fe ions. The new laboratory reference data will help to fully utilize the diagnostic potential of this new era of high-resolution X-ray astrophysics.

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Natalie Hell
Lawrence Livermore Natl Lab

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