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Charge-Exchange Factor in EBIT Spectral Analysis[1] YANG YANG, ENDRE TAKACS, ADAM HOSIER, Clemson University, DIPTI FNU, YURI RALCHENKO, PAUL SZYPRYT, GALEN O'NEIL, JOSEPH N. TAN, AUNG S. NAING, National Institute of Standards and Technology, AMY GALL, ADAM FOSTER, NANCY BRICKHOUSE, RANDALL SMITH, Harvard-Smithsonian Center for Astrophysics, Cambridge, DAVID SCHULTZ, Northern Arizona University, Flagstaff, AZ — The intensity analysis of the spectra of highly charged ions in electron beam ion traps (EBIT) requires accurate experimental or theoretical ionization, excitation, and recombination cross sections and device parameters, like electron beam density and energy, and trapped ion temperatures. Because of the generally high charge state of the trapped ions, charge exchange recombination with residual gases requires sophisticated analysis to correctly account for. By introducing the charge exchange factor, the constraint of accurate charge exchange cross section and device conditions are replaced by the determination of a single parameter, which is a combination of all these factors. If accurately determined experimentally, the charge exchange factor allows for accurate prediction of relative spectral line intensity ratios, determination of ionization or recombination cross sections, or device parameters. As an example, X-ray spectra of highly charged ions of Fe produced in the EBIT at National Institute of Standards and Technology with the beam energy varying between 9.21 keV and 18.00keV will be presented. Spectra were recorded by an array of transition-edge sensor (TES) x-ray microcalorimeters. The analysis of the measured spectra was performed via detailed collisional-radiative modeling of the non-Maxwellian plasma. [1] P. Szypryt et al., Rev. Sci. Instrum. 90, 123107 (2019). [2] Yu. Ralchenko and Y. Maron, J. Quant. Spectr. Rad. Transf. 71, 609 (2001).

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