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EBIT measurements of excitation and ionization by electron impact¹

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Electron-impact excitation and electron-impact ionization are fundamental atomic processes that are critical for describing both the ionization balance and the radiative emission of ions in plasmas. The properties of the electron beam ion trap (EBIT) made it a highly useful device for measuring electron-impact cross sections of highly charged ions. Moreover, the recent development and use of x-ray microcalorimeter array detectors made it possible to extend cross section determinations to ions with multiple valence electrons and to measure the ionization equilibrium of complex ions. Since EBIT's inception in the 1980's measurements include cross sections of direct and indirect (resonance) excitation as well as cross sections of single-electron ionization of K-shell and L-shell ions of Ti, V, Cr, Mn, and Fe. Studies of very high-Z elements, such as Xe, Au and U, have been performed, showing the importance of the Breit interaction, which in the case of K-shell uranium ions increases the ionization cross section by 50%. This talk will review the results of such measurements performed at EBIT for nearly three decades.

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