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The Impact of Experimentally Measured Dielectronic Recombination Rate Coefficients on Photoionized Plasmas[1] PIERCE JACKSON, MICHAEL FOGLE, STUART LOCH, Auburn University, FRANCISCO GUZMAN, University of Kentucky — Electron-Ion recombination is an important process in laboratory and astrophysical plasma environments. It affects the charge states of elements, the resulting spectral emission, and many plasma diagnostic tools. This in turn impacts cosmological elemental abundance determinations. Theoretical Dielectronic Recombination (DR) rates, a type of electron-ion recombination process, are known to have large uncertainties at low electron-temperatures. These DR rates can be measured accurately using experiments, with data existing for a few ions. These experimental measurements, combined with higher energy theoretical rates, produce hybrid rates that represent the most accurate DR rate available for that ion. To determine how these hybrid rates impact plasma simulations, we use the photoionization code CLOUDY to model common low-temperature astrophysical plasma environments. Significant differences are found between simulations that use theoretical DR rates versus experimentally measured values. Given the small number of DR measurements that exist, more storage ring measurements should be conducted for astrophysically important ions. Also, theoretical advances are required for low temperature DR and photoionized plasma simulations should use the experimental DR rates in their databases.

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