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Abundances of Elements in Nebulae and Chemical Evolution of the Universe[1] SULTANA NAHAR, M. DANCE, E. PALAY, A. PRADHAN, The Ohio State University — Ionized gasous nebulae are associated with both the birth of stars and the endpoints of stellar evolution.[2] Their chemical enrichment is therefore a chronometer of the life of the universe itself. But there are vast uncertainties in determining nebular abundances of common elements such as C, N, O, Ne, Fe etc. One of the most fundamental astrophysical problem is the discordant abundances obtained from collisionally excited lines and those from recombination lines. Part of the reason is the accuracy of atomic physics. With inclusion of higher order relativistic effects in the Breit-Pauli R-matrix codes[1], high accuracy collision strengths are being computed. We find significant effects due to fine structure and resonances in the low energy region. Results are presented for the forbidden optical and far-infrared transitions in two of the most important ions in nebular temperature and density diagnostics: [Ne V] and [O III]. We also compare and contrast collisional excitation with electron-ion recombination. The far-infrared lines are of particular interest since they spectroscopically reveal Ultra Luminous Infrared Galaxies buried in heavily dust obscured regsions at high redshift, observed by three space observatories: SPITZER, HERSCHEL, SOFIA.

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