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R-Matrix Calculations of Plasma Opacities[1] ANIL PRADHAN, SULTANA NAHAR, LIANSHUI ZHAO, Ohio State Univ - Columbus, WERNER EISSNER, University of Stuttgart, REGNER TRAMPEDACH, Space Sciences Institute, CLAUDIO MENDOZA, University of Western Michigan — A renewed effort is in progress to implement the R-Matrix (RM) methodology developed for the Opacity Project to compute astrophysical opacities. The coupled channel (CC) calculations should be of higher accuracy than the distorted wave (DW) approximation heretofore employed for opacities calculations, and would precisely incorporate autoionization and coupling effects. The resulting energy distribution of the RM opacity spectrum at solar interior conditions is found to be significantly different than the DW, and mean opacities are higher than other opacity models [1]. Results are compared with available experimental data as well as other theoretical models. A new treatment of plasma broadening of autoionizing resonances is described, as well as an improved Equation-of-State. Specific features of bound-free photoionization cross sections relevant to plasma opacity are illustrated. Convergence of CC wavefunction expansion with respect to the large number of target ion levels included in the calculations, and completeness using "top-up" DW atomic data, is discussed. Future plans include extensive opacity calculations for iron and oxygen that are generally of higher abundance in stellar interiors than other metals. [1]. A.K. Pradhan and S.N. Nahar, PASP Conf. Ser., 515, 79, 2018.

[1]National Science Fioundation, Department of Energy

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