Light element opacities of astrophysical interest from ATOMIC

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Abstract. We present new calculations of local-thermodynamic-equilibrium (LTE) light element opacities from the Los Alamos ATOMIC code [1] for systems of astrophysical interest. ATOMIC is a multi-purpose code that can generate LTE or non-LTE quantities of interest at various levels of approximation. Our calculations, which include fine-structure detail, represent a systematic improvement over previous Los Alamos opacity calculations using the LEDCOP legacy code [2]. The ATOMIC code uses *ab-initio* atomic structure data computed from the CATS code, which is based on Cowan's atomic structure codes [3], and photoionization cross section data computed from the Los Alamos ionization code GIPPER. ATOMIC also incorporates a new equation-of-state (EOS) model based on the chemical picture [4]. ATOMIC incorporates some physics packages from LEDCOP and also includes additional physical processes, such as improved free-free cross sections and additional scattering mechanisms. Our new calculations are made for elements of astrophysical interest and for a wide range of temperatures and densities. Selected comparisons of our new opacity calculations with several other sets of calculations will be presented at the meeting. In particular, we will present detailed comparisons of Rosseland-mean opacity calculations with Opacity Project (OP) [5] and OPAL calculations [6] for hydrogen, helium, and iron. For iron, we also compare our monochromatic opacity calculations with recent work [7].

Keywords: opacity, astrophysics

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