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**Detailed opacity calculations for stellar models** JEAN-CHRISTOPHE PAIN, FRANCK GILLERON, Commissariat a l'Energie Atomique (CEA) — We present a state of the art of precise spectral opacity calculations illustrated by stellar applications. The essential role of laboratory experiments to check the quality of the computed data is underlined. We review some X-ray and XUV laser and Z-pinch photo-absorption measurements as well as X-ray emission spectroscopy experiments of hot dense plasmas produced by ultra-high-intensity laser interaction. The measured spectra are systematically compared with the fine-structure opacity code SCO-RCG. Focus is put on iron, due to its crucial role in the understanding of asteroseismic observations of Beta Cephei-type and Slowly Pulsating B stars, as well as in the Sun. For instance, in Beta Cephei-type stars (which should not be confused with Cepheid variables), the iron-group opacity peak excites acoustic modes through the kappa-mechanism. A particular attention is paid to the higher-than-predicted iron opacity measured on Sandia's Z facility [J. Bailey et al., Nature 517, 56 (2015)] at solar interior conditions (boundary of the convective zone). We discuss some theoretical aspects such as orbital relaxation, electron collisional broadening, ionic Stark effect, oscillator-strength sum rules, photo-ionization, or the "filling-the-gap" effect of highly excited states.

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