Nahar and Pradhan Reply: The NP work [1] reported the first coupled-channel (CC) ***R***-matrix (RM) calculations carried through to opacities for an atomic system. The *ab inito* CC calculations demonstrated convergence in terms of multichannel wavefunction expansion, coupled to successively higher photoionized core ion states. The RM method differs fundamentally from distorted-wave (DW)-type approximations, employed in current opacity models mentioned in the preceding Comment [2], which neglect channel coupling and cannot generate physical resonance profiles—although resonance contributions are included perturbatively. In contrast, the CC RM method includes the intrinsic and characteristically asymmetric shapes, heights, and energy ranges of precisely delineated infinite series of autoionizing resonances converging onto each excitation threshold naturally in photoionization cross sections. This important physics is neglected in existing opacity models. In addition, effects of plasma broadening on resonances also need to be considered. Elaborate line broadening treatments for bound-bound transitions are generally incorporated since they considerably affect mean and monochromatic opacities. Likewise, it is essential to include inherent autoionizing resonance broadening of the bound-free continuum for improved accuracy, as shown by NP (also [3]). This natural broadening is particularly manifest in the huge photoexcitation-of-core or Seaton resonances extending over hundreds of eV that are a major contributor to bound-free opacity. As such, the CC method accounts for deficiencies of the DW method in general, and not only OP as stated by the authors. The DW method does not yield cross sections that can be compared in detail with CC cross sections. Hence, the NP CC cross sections are compared with similar but much simpler OP RM calculations to illustrate the large enhancements and convergence, that is also found to result in 35% increase in the Rosseland mean opacities (RMO) under conditions in the Sandia Z experiment [4].

The monochromatic opacity spectrum presented by NP covers only the wavelength range in the Z experiment, 7–13 Å. However, most of the Fe XVII opacity contributing to the RMO is from a much lower energy range, broadly peaking around 17 Å. The full RM monochromatic opacity spectrum differs considerably from OP for $\lambda > 13$ Å, not shown in Fig. 1. Although OP is either higher or lower at several wavelengths, the overall effect is significant enhancement of RMOs, and especially the absence of opacity "windows" observed experimentally [4], which compensates for the missing bound-free continuum opacity. The complete Fe XVII opacity results were not presented owing to *Physical Review Letters* space constraints, and as they require a more detailed discussion (in preparation for publication). There are two important criteria in opacities calculations: accuracy and completeness. The elementary f-sum rule invoked by the authors provides an upper bound towards completeness, but it is irrelevant to ensure accuracy of the atomic physics approximation and physical effects incorporated therein. At a given temperature and density many ions may contribute, each satisfying its own f-sum. But the opacity depends on relative contributions of all ions, in a given frequency range, in terms of the differential oscillator strength(s) which, in turn, depend on the accuracy of the atomic physics.

The authors of the Comment do not contradict the NP results. Rather, they report data from various DW-type codes in Table 1 showing similar enhancements, albeit with ~30% spread among different sets. We first note that several Fe ionization states contribute, with fractions Fe XVI (0.031), Fe XVII (0.195), Fe XVIII (0.372), Fe XIX (0.284), Fe XX (0.098), and Fe XXI (0.013). Thus, Fe XVII-XX would contribute much more than Fe XVII alone. Therefore, we cannot and did not claim agreement with the measured opacities, particularly in the 7–9 Å region where experimental data differ from all opacity models. Now, the RM monochromatic opacity is lower than the OP and other DW models for $\lambda < 12$ Å in Fig. 1 of the Comment. Although that range is of marginal importance to the Fe XVII RMOs, a more detailed comparison is needed to ascertain the accuracy of DW vs RM cross sections. There are two reasons that might marginally increase the RM opacity. The first is due to even higher excitation thresholds of Fe XVIII than in the NP work. The second is a numerical cutoff in the new electron impact broadening routine that neglects the higher energy side of the broadened profile, but which is retained to delineate the highest threshold effects [3]. Given the high cost and effort involved in large CC calculations, addressing the first reason is rather prohibitive; the second one is trivial and would be incorporated in future CC RM opacities work. The concluding sentence of the Comment is speculative.

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