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Revised laboratory measurements of iron opacity for stellar interiors. JAMES BAILEY, G.P. LOISEL, T. NAGAYAMA, S.B. HANSEN, G.A. ROCHAU, Sandia National Laboratories — Models for stars, including our Sun, require accurate opacities. Thus, the persistent discrepancy between opacity model predictions and published measurements from Z experiments poses a dilemma for stellar astrophysics [Bailey et al, Nature (2015)]. Recent systematic measurements as a function of atomic number showed that either opacity theories are missing physics that has nonmonotonic dependence on the number of bound electrons or there is an experimental flaw unique to iron measurements at temperatures above 180 eV. The supposed flaw is not present at lower temperatures and densities [Nagayama et al. PRL (2019)]. To resolve this issue, we are performing new iron opacity experiments that replicate the high temperature conditions and extend the measurement to even higher temperature values. Furthermore, we are re-analyzing the opacity data using refined analysis methods that provide higher accuracy and reliability. The goal is benchmark opacity measurements with the highest possible confidence. Sandia National Laboratories is a multimission laboratory managed and operated by NTESS LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. DOE's NNSA under contract DE- NA0003525.

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