Abstract Submitted
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Z opacity sample evolution using time-resolved spectroscopy with a gated hybrid CMOS detector.[1] GUILLAUME LOISEL, JAMES BAILEY, TAISUKE NAGAYAMA, GREG DUNHAM, PAUL GARD, GREGORY ROCHAU, ANTHONY COLOMBO, AARON EDENS, QUINN LOOKER, KIMMEL MARK, JOHN STAHOVIAK, JOHN PORTER, Sandia National Laboratories — No convincing model revisions nor systematic experimental errors have yet resolved the model/data discrepancy in Fe opacity measurements at high temperatures >180 eV and high electron densities >3x10^{22} cm^{-3} [Bailey et al, Nature (2015), Nagayama et al. PRL (2019)]. This injects uncertainty into stellar interior models. Systematic errors from unresolved temporal gradients are one possible hypothesis, despite evidence that such errors are unimportant. Data recorded on x-ray film provide measurements over a time determined by the backlighter duration, but direct time-resolved measurements didn't exist until now. The novel hCMOS Ultra-fast X-ray Imager technology developed at Sandia National Laboratories and implemented in the opacity spectrometers allows such tests for the first time. Mg K-shell absorption were recorded to measure the opacity sample evolution across low and high temperature and density conditions. These measurements enable further evaluation of possible temporal gradient effects, test simulation predictions, and can optimize future opacity experiment designs.

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