

Accepted Manuscript

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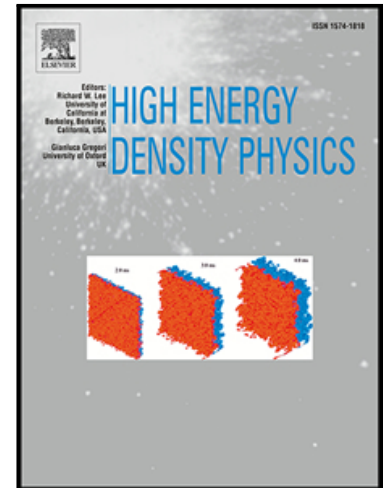
PII: S1574-1818(18)30014-4
DOI: [10.1016/j.hedp.2018.02.003](https://doi.org/10.1016/j.hedp.2018.02.003)
Reference: HEDP 650

To appear in: *High Energy Density Physics*

Received date: 21 December 2017
Revised date: 11 February 2018
Accepted date: 16 February 2018

Please cite this article as: A.M. Saunders, D.A. Chapman, A.L. Kritcher, M. Schoff, C. Shulberg, O.L. Landen, S.H. Glenzer, R.W. Falcone, D.O. Gericke, T. Döppner, Influence of Argon Impurities on the Elastic Scattering of X-Rays from Imploding Beryllium Capsules, *High Energy Density Physics* (2018), doi: [10.1016/j.hedp.2018.02.003](https://doi.org/10.1016/j.hedp.2018.02.003)

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Influence of Argon Impurities on the Elastic Scattering of X-Rays from Imploding Beryllium Capsules

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Abstract

We investigate the effect of argon impurities on the elastic component of x-ray scattering spectra taken from directly driven beryllium capsule implosions at the Omega laser. The plasma conditions were obtained in a previous analysis (A. L. Kritcher *et al.*, Phys. Rev. Lett., **107**, 015002 (2011)) by fitting the inelastic scattering component. We show that the known argon impurity in the beryllium modifies the elastic scattering due to the larger number of bound electrons. We indeed find significant deviations in the elastic scattering from roughly 1 atomic % argon contained in the beryllium. With knowledge of the argon impurity fraction, we use the elastic scattering component to determine the charge state of the compressed beryllium, as the fits are rather insensitive to the argon charge state. Finally, we discuss how doping small fractions of mid- or high-Z elements into low-Z materials could allow ionization balance studies in dense plasmas.

Keywords: warm-dense-matter, dense plasmas, x-ray Thomson scattering, ionization balance

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