

Oxygen opacity experiments for stellar interiors at Z and NIF

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Much of what we know about the universe is rooted in our understanding of the Sun. However, ongoing disagreement between solar models and helioseismic measurements of the interior structure of the Sun raises concerns about the accuracy of stellar models. One hypothesis that could help resolve this discrepancy is that the opacities of matter at solar interior conditions are higher than models predict. Experiments on the Z Machine and at NIF investigate this by measuring iron and oxygen opacities at conditions near the solar convection zone base (CZB). The published iron measurements [1] are higher than model predictions, supporting this hypothesis. This talk will focus on the progress of the oxygen opacity experiments at each facility. Oxygen is the largest contributor to the opacity at the solar CZB and no experimental benchmark in this regime exists to date. We will discuss our methods for characterizing the opacity and plasma conditions and show preliminary oxygen measurements from both Z and NIF.

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References

[1] Bailey, J., Nagayama, T., Loisel, G. et al. *Nature* **517**, 56–59 (2015).

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