Absorption and Scattered-Light Asymmetry in OMEGA Implosions



D.H. Edgell University of Rochester Laboratory for Laser Energetics



CBET beamlets image



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Summary Unabsorbed light measurements show anomalously large variations around the target

- Uniform laser energy absorption is essential for successful laser direct drive implosions and if absorption is uniform, the unabsorbed light scattered around the target chamber should be uniform as well
- Multiple different diagnostics on OMEGA show that variations are as large as tens of percent
- Possible sources of the asymmetry include: Beam pointing, Target offset, Polarization effects
- Sources of the asymmetry and increased diagnostic coverage are being investigated



Collaborators

R. Bahr, J. Katz, and D. H. Froula

University of Rochester Laboratory for Laser Energetics



The energy absorbed in the target is diagnosed by measuring the amount of unabsorbed light that leaves the target





Predicted variations in total absorbed and scattered energy are a few percent



Large imbalances in the total scattered light measured by the scattered light calorimeters have been observed





Images of the time integrated scattered light over a port show variation is not symmetric, and is larger (~10%) than predicted





Differences of 10's of percent are observed between beamlet spots that should have identical intensities in a symmetric implosion



In a symmetric implosion, all beamlets in a radial "group" have equivalent pathways and interactions so they should have similar intensities



There are indications that some of the large differences between the calorimeter measurements are due to target/beam pointing offset



The scattered light around the chamber might be used to detect improper target/beam pointing offsets





A target/beam pointing offset may not be the complete story as a variation of the order of 10% still existed after the offset correction



Variation across port was less but still significant and not centered on port



Could LPI effects due to polarization be affecting the scattered light distribution?



LLE is investigating whether polarization imbalance from the laser system or if it is being altered by LPI (CBET)



Summary

Unabsorbed light measurements may indicate some process is causing anomalously large variations in absorption around the target

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