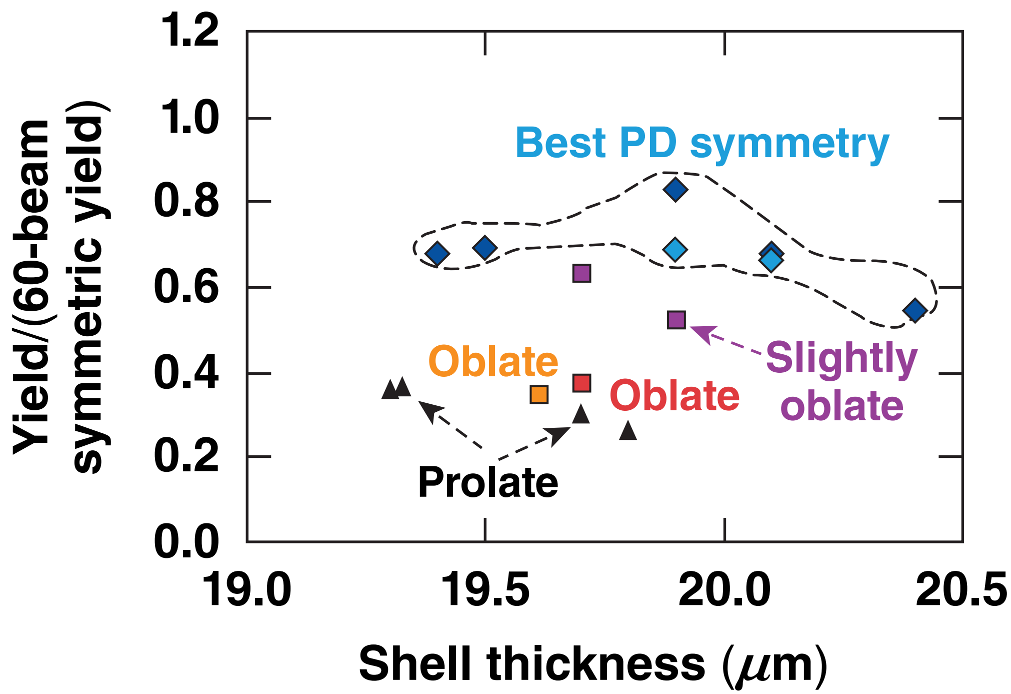
# NIF-Relevant, Polar-Drive Tests on OMEGA

PD yield comparison
15-atm-$D_2$–filled, 865-$\mu$m-diam, 20-$\mu$m-thick CH shells
1-ns-sq pulse, 15.3 kJ





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**Summary**

# Irradiation experiments on OMEGA have verified our ability to predict polar-drive conditions on the NIF

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- Six different beam-pointing configurations were used to explore the dependence of polar-drive implosion symmetry on beam pointing
- The implosions were diagnosed with framed x-ray backlighting and by the fusion-yield performance of the implosions
- The more-symmetric cases, as determined by the framed radiographs, had the highest fusion yields
- 2-D *DRACO* simulations match the shell size and shape, giving confidence in our ability to predict conditions on the NIF

# Collaborators


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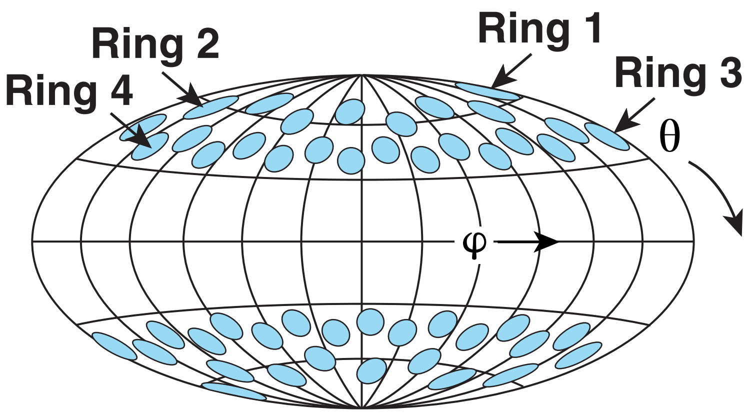
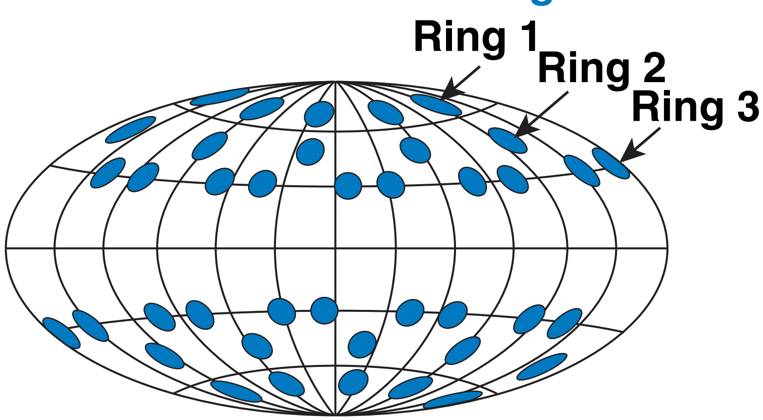
**Related talks:
W. McKenty (BO5.5).
R. S. Craxton (BO5.8).
A. Shyvdky (CO5.2).**

# Six different NIF-relevant, beam-pointing cases were explored on OMEGA using polar-drive illumination

NIF 48-quad configuration




OMEGA 40-beam PDD configuration




- Laser conditions
  - 1-ns sq pulse, 15.3 kJ, 40 beams
  - 1 THz with polarization smoothing
  - same energy for 60-beam shots
- Target type
  - 15-atm-$D_2$–filled, 865-$\mu$m-diam, 20-$\mu$m-thick CH shells

$\theta$ = beam or quad colatitude
$\varphi$ = beam or quad azimuth

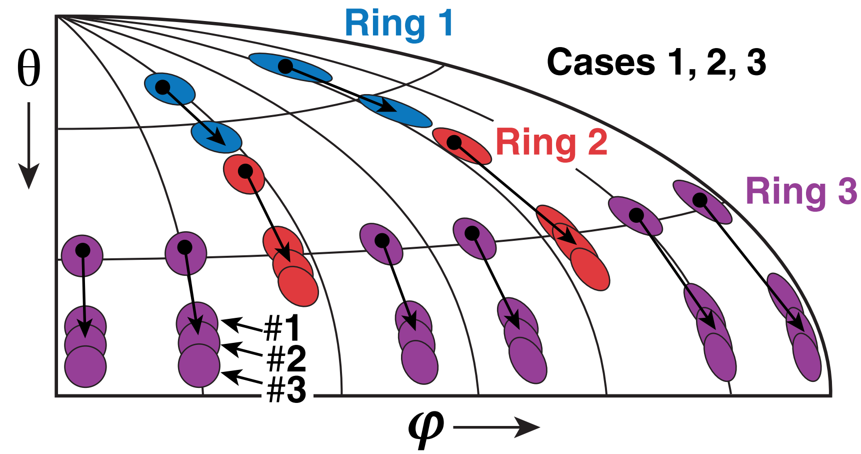
# Six beam-pointing configurations were tested, including some with variations in azimuth

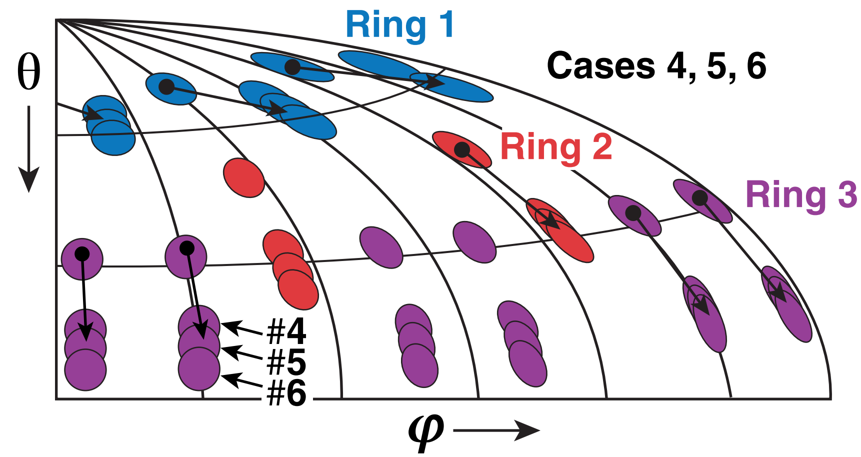
**Cases 1, 2, 3**
**Changes in θ only**

**<u>Ring 1, 2, 3</u>**
**#1 (90, 120, 120) μm offsets**
**#2 (90, 150, 150)**
**#3 (90, 180, 180)**

**Cases 4, 5, 6**
**Changes in θ for all beams**
**Ring 1 beams have Δφ = 36°**

**<u>Rings 4, 5, 6</u>**
**#4 (112, 112, 112) μm offsets**
**#5 (126, 126, 126)**
**#6 (141, 141, 141)**




**φ variations were explored to minimize drive asymmetry.**

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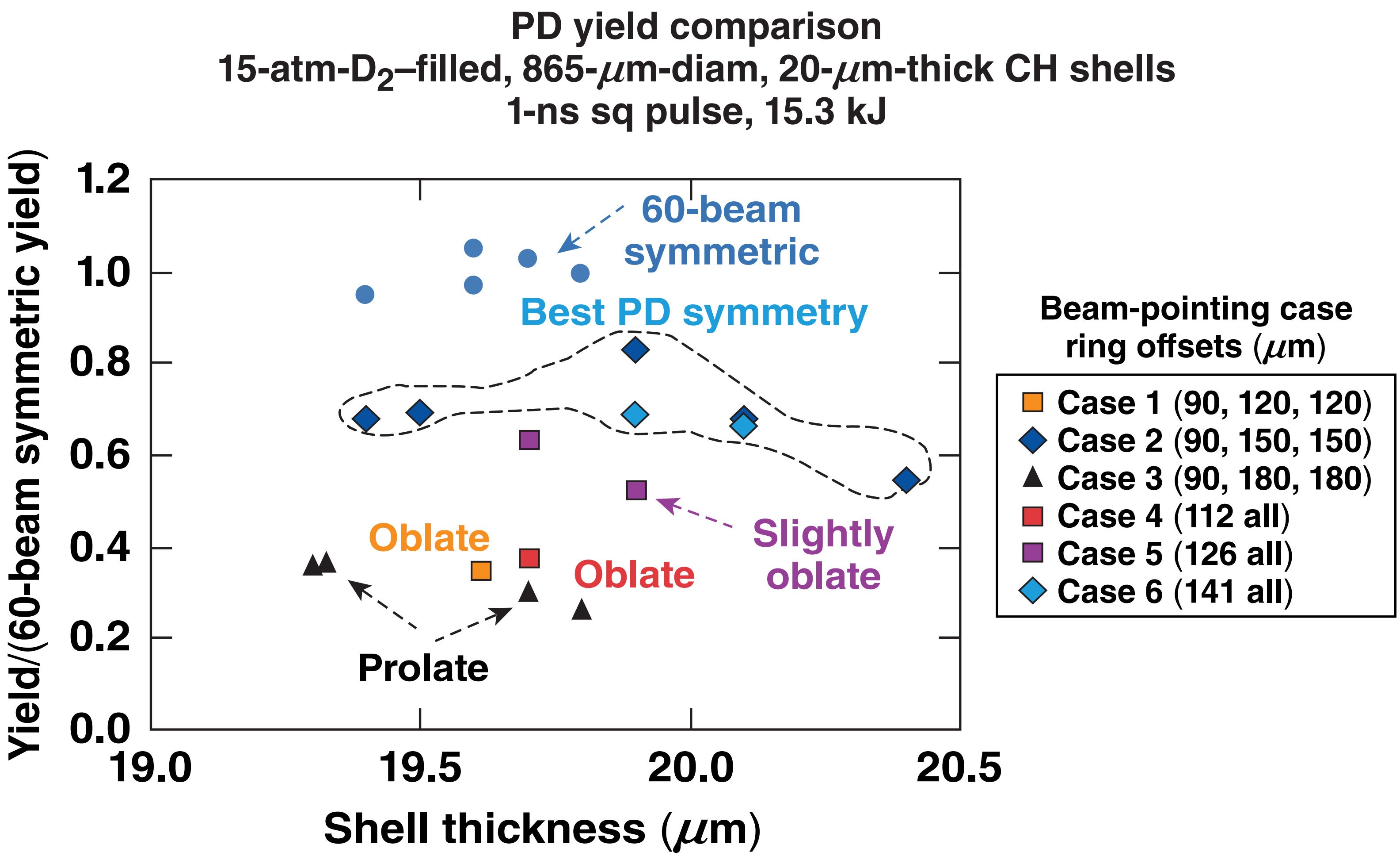
# The best polar-drive yield is obtained for the most-symmetric implosions as determined from framed x-ray radiographs

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## Summary/Conclusions

# Irradiation experiments on OMEGA have verified our ability to predict polar-drive conditions on the NIF

- **Six different beam-pointing configurations were used to explore the dependence of polar-drive implosion symmetry on beam pointing**
- **The implosions were diagnosed with framed x-ray backlighting and by the fusion-yield performance of the implosions**
- **The more-symmetric cases, as determined by the framed radiographs, had the highest fusion yields**
- **2-D *DRACO* simulations match the shell size and shape, giving confidence in our ability to predict conditions on the NIF**