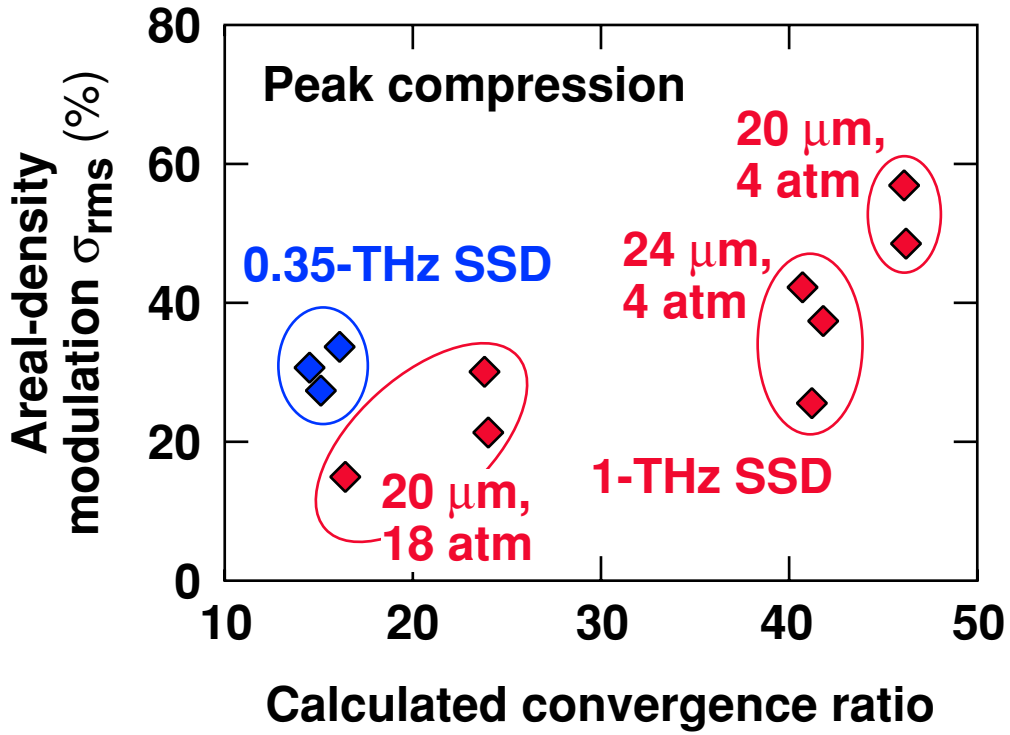
Deceleration Phase Rayleigh–Taylor Instability in Spherical Implosions



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Summary

The growth of inner-shell modulations has been measured in the deceleration phase of spherical implosions

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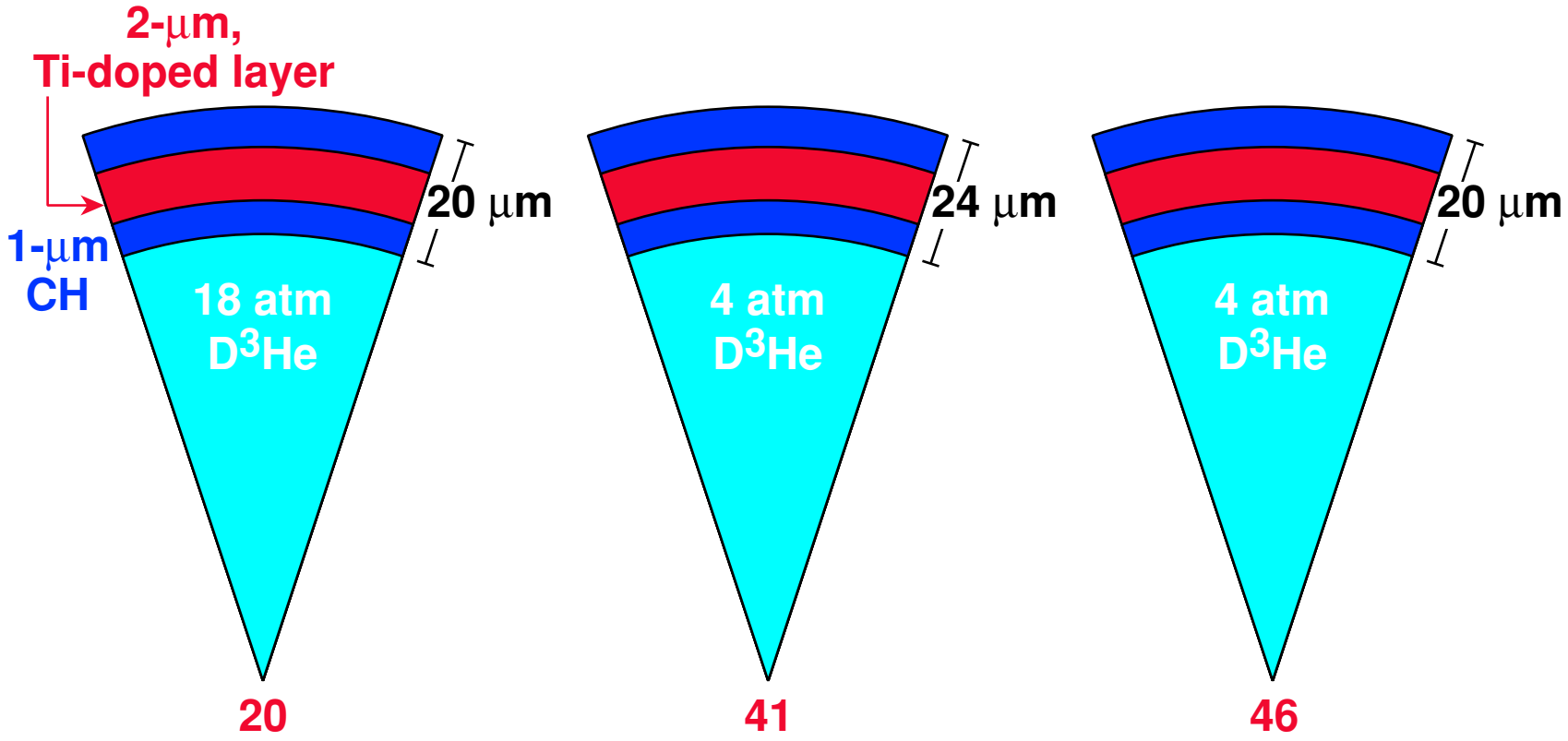
- Spherical targets with convergence ratios of 20, 41, and 46 have been studied.
- Inner-shell modulations grow throughout the deceleration phase of spherical implosions.
- At peak compression, measured nonuniformity levels are 23%, 36%, and 53% for convergence ratios 20, 41, and 46, respectively.
- Implosions with 1-THz SSD and PS perform slightly better than those with three-color-cycle, 0.35-THz SSD and PS (23% versus 31% at peak compression).

Three types of targets were used in these experiments



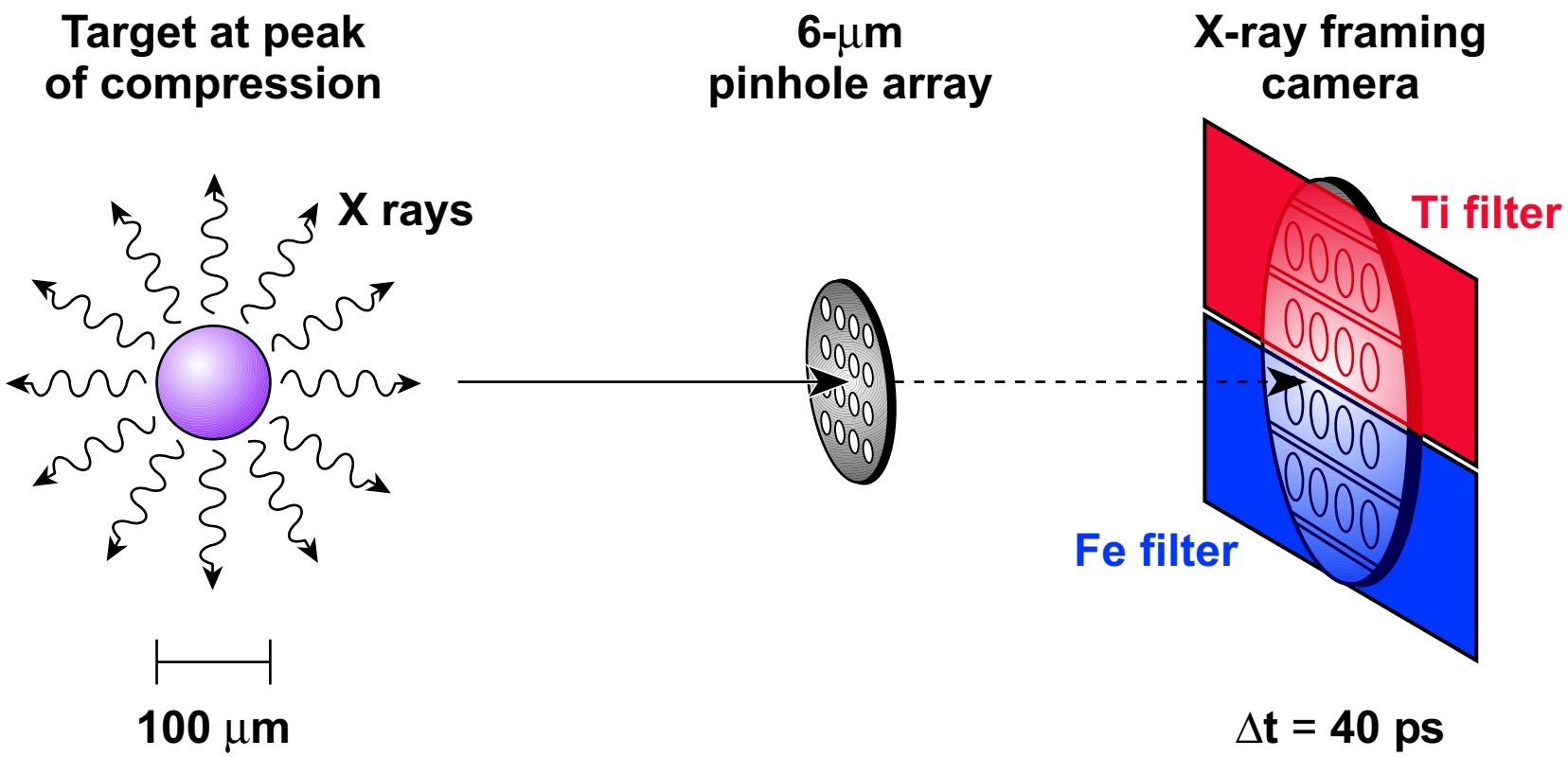
Calculated convergence ratios

- The Ti-doped layer is offset by 1 μm of CH from the inner surface.
- All three types of targets were shot with one-color-cycle, 1-THz SSD.
- The first target type was also shot with three-color-cycle, 0.35-THz SSD and PS.

E11233

Shell-Integrity Measurements

X-ray framing cameras are the primary diagnostics of shell nonuniformity



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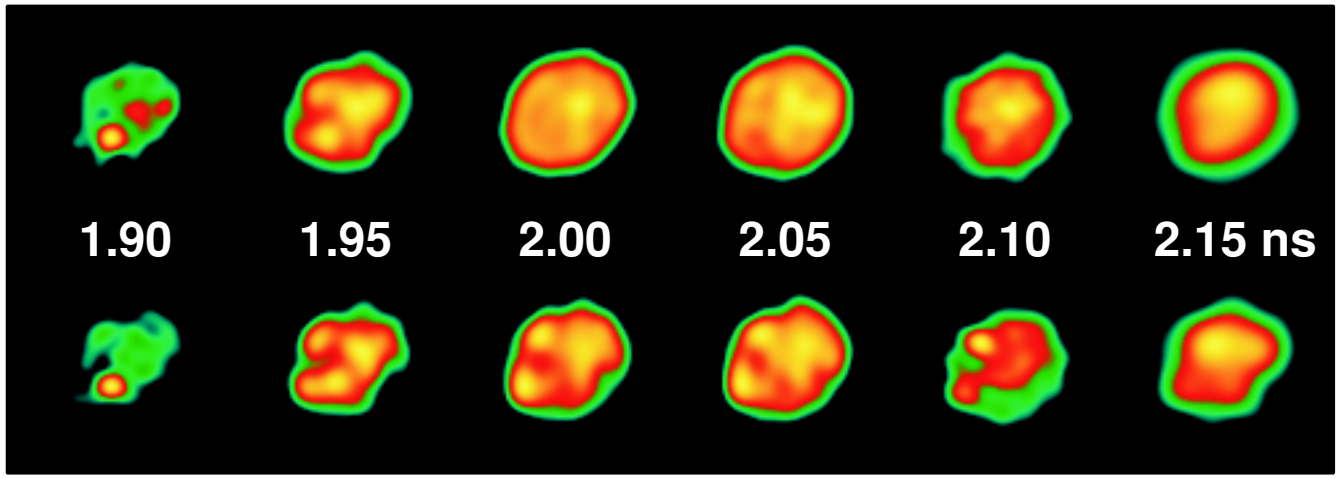
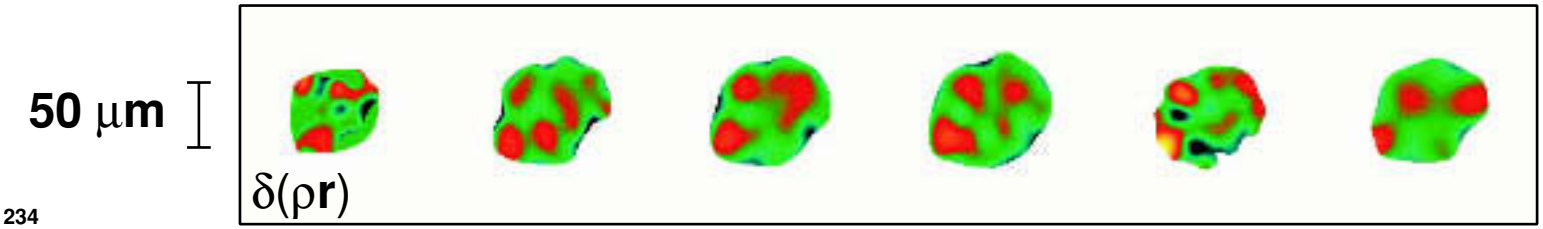
The ratio of images above and below the *K* edge is related to areal-density modulations in the shell

Shot 22102, 4 atm D^3He, 20-μm shell



$$\delta(\rho r) = \frac{\delta\left\{\ell n\left(\frac{I_{<K}}{I_{>K}}\right)\right\}}{\mu_{>K} - \mu_{<K}}$$

$\mu_{>K}$, $\mu_{<K}$: titanium absorption rates above and below the *K* edge



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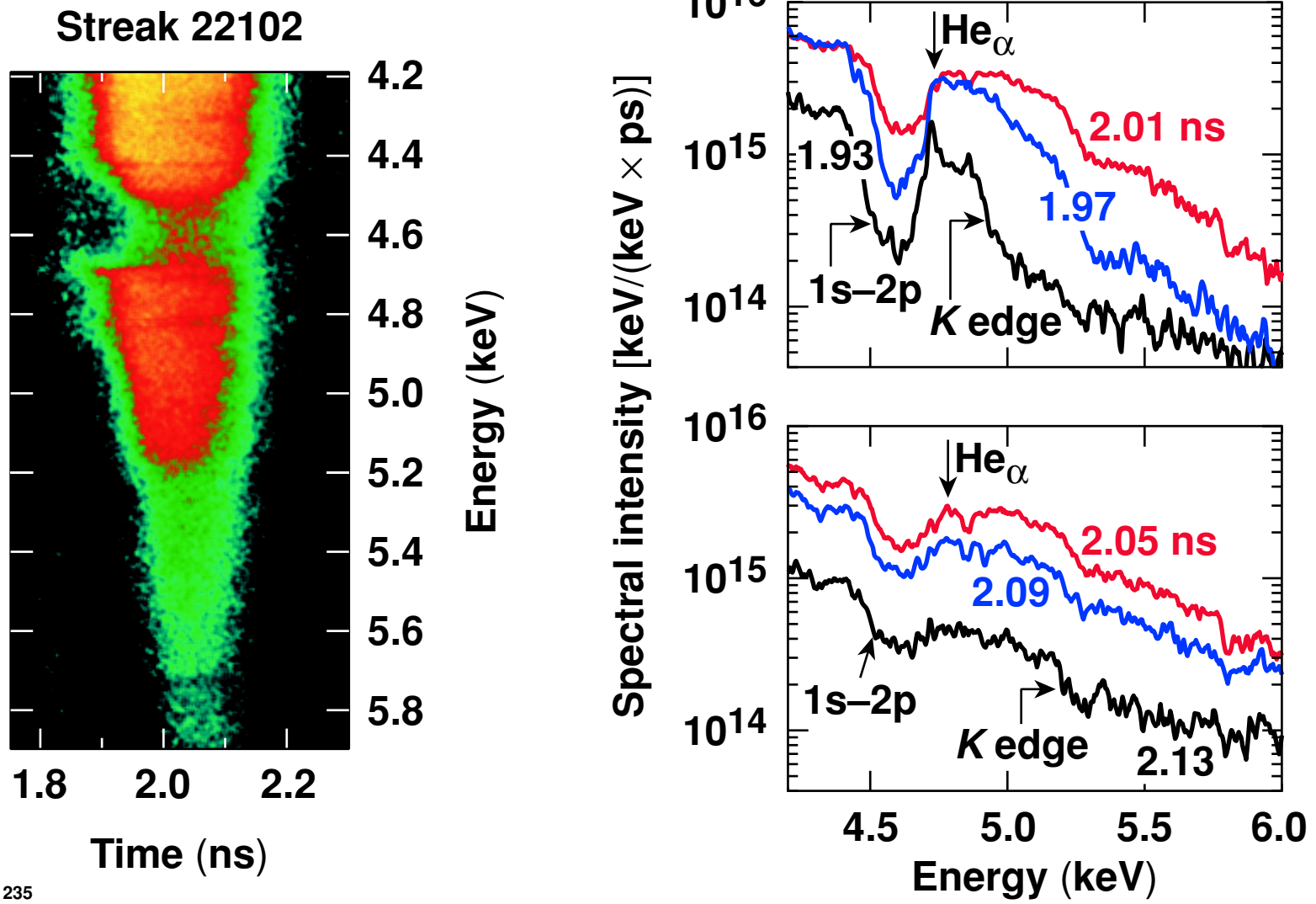
Measured spectra contain information about shell-areal-density evolution



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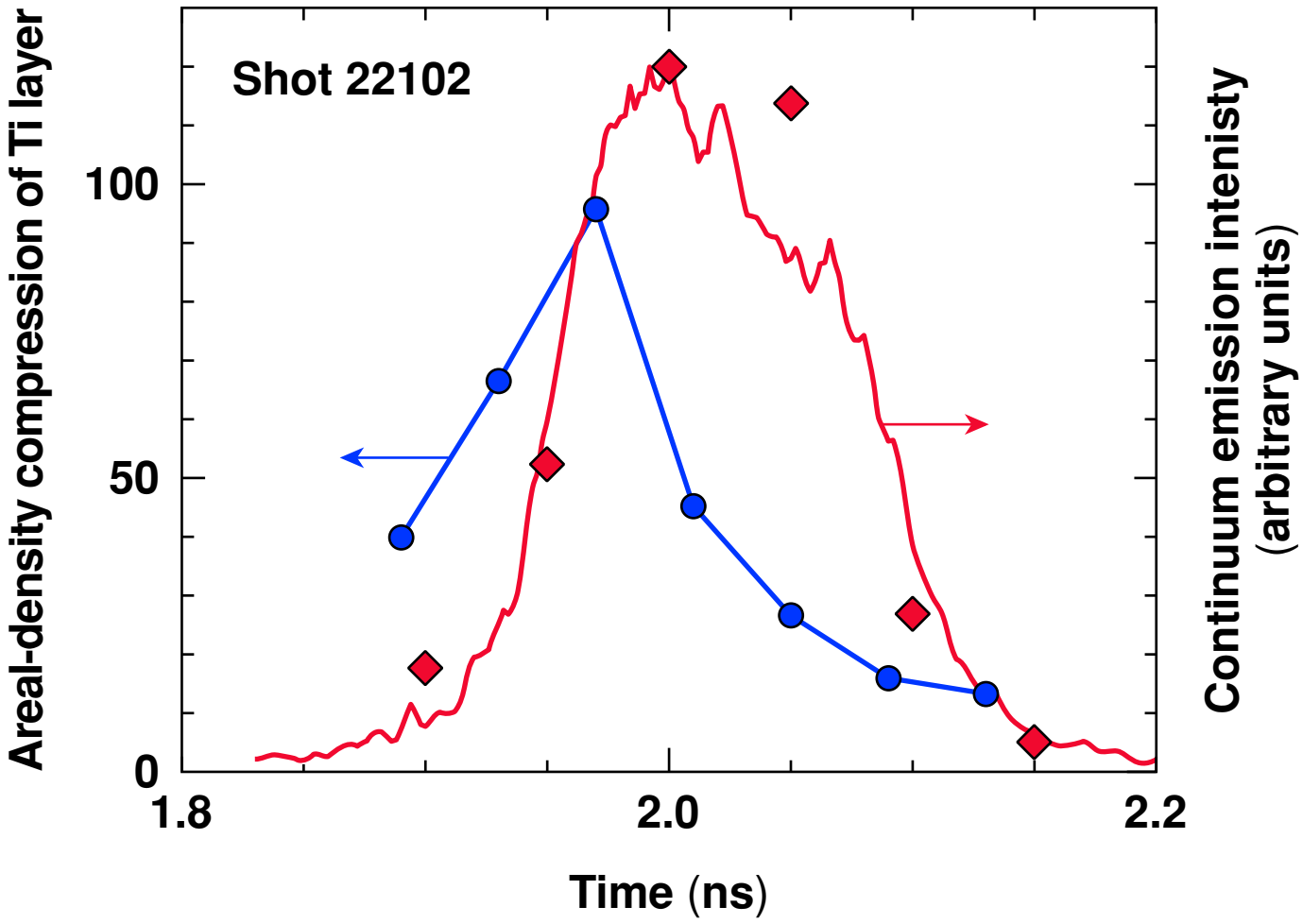
Measured shell areal density increases with compression and decreases with decompression and heating



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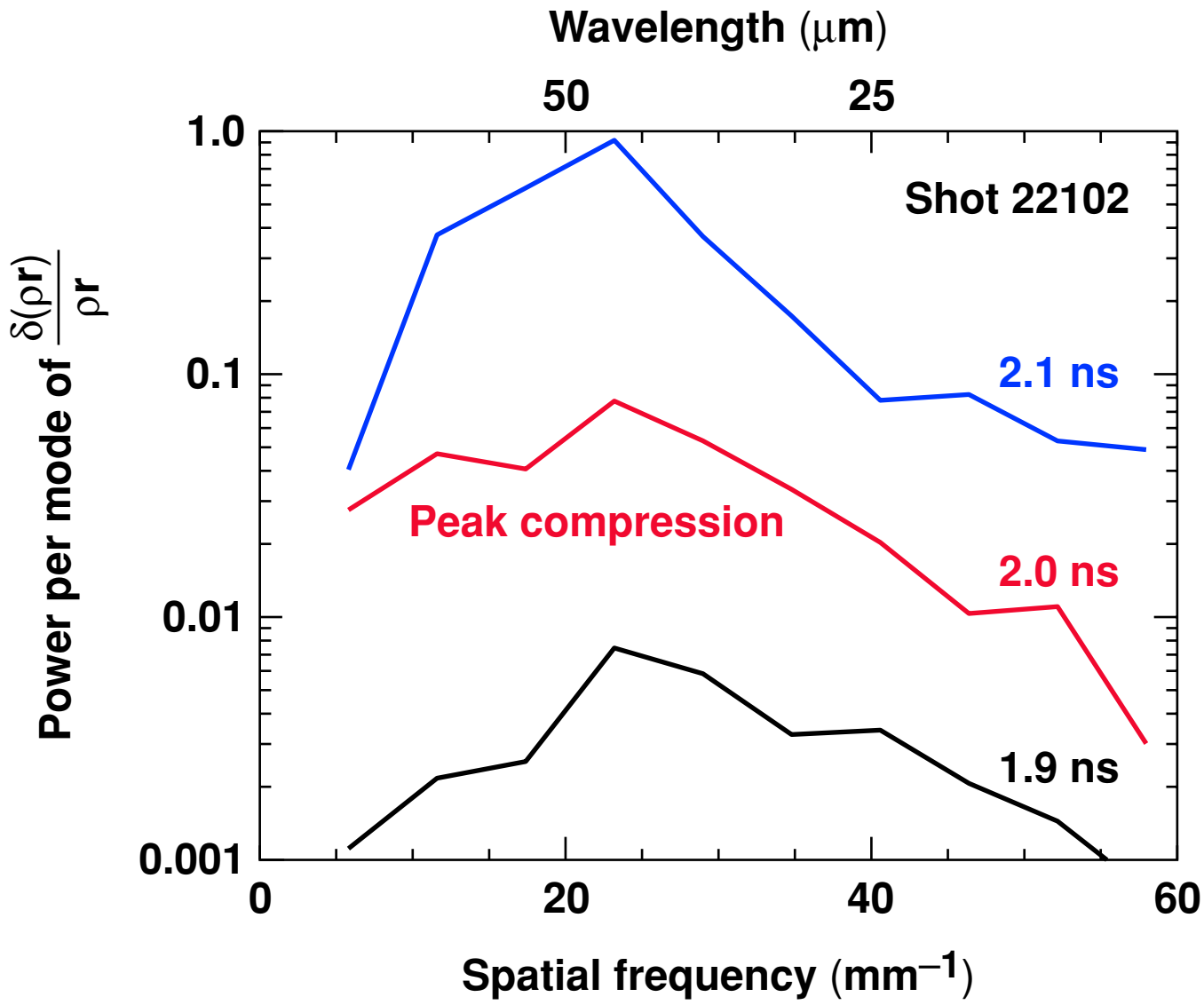
Inner-shell modulations grow throughout the implosion's deceleration phase



E11237

At peak compression more-unstable implosions have higher shell-modulation levels

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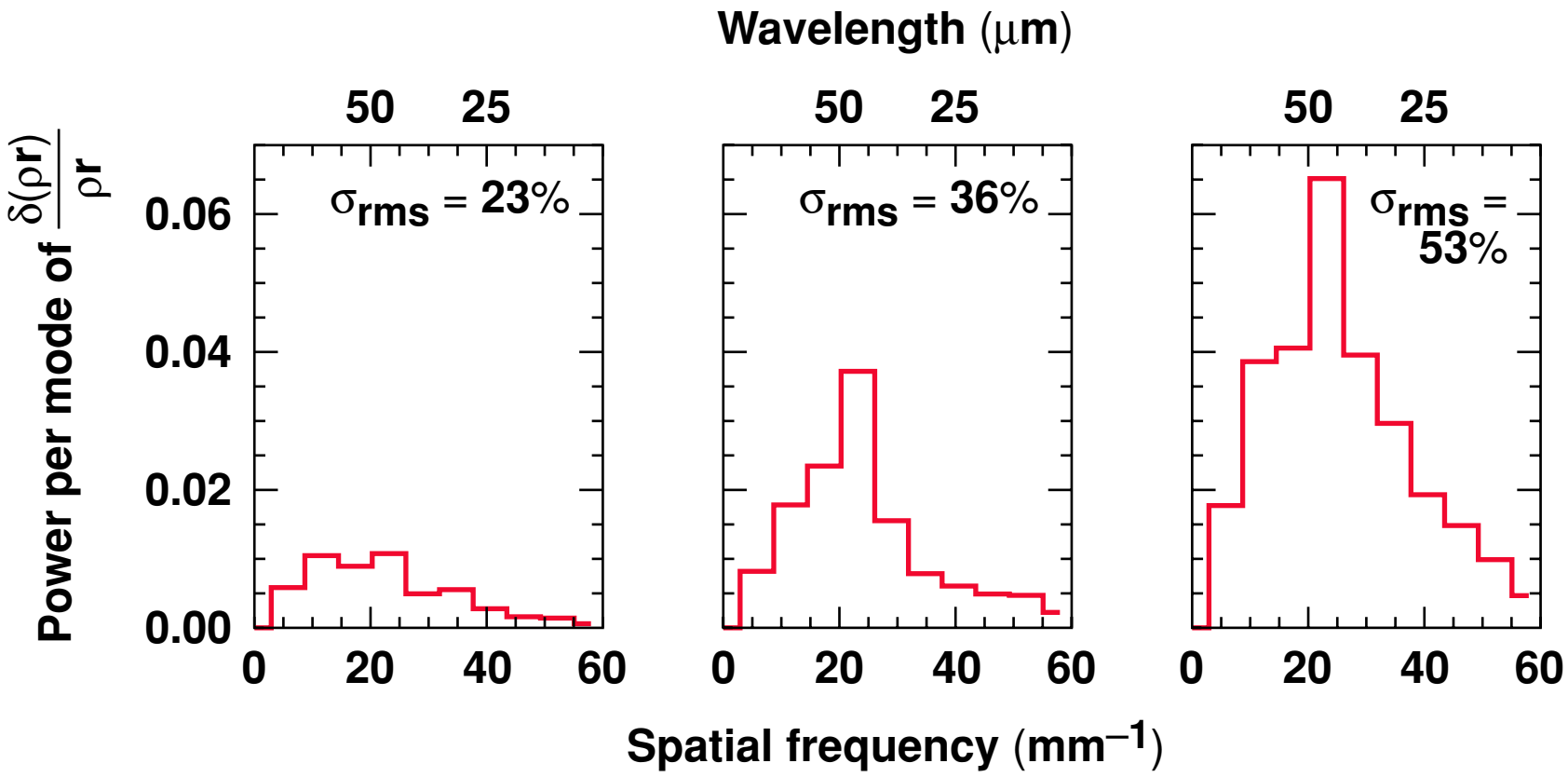
Peak compression



Convergence ratio = 20

Convergence ratio = 41

Convergence ratio = 46

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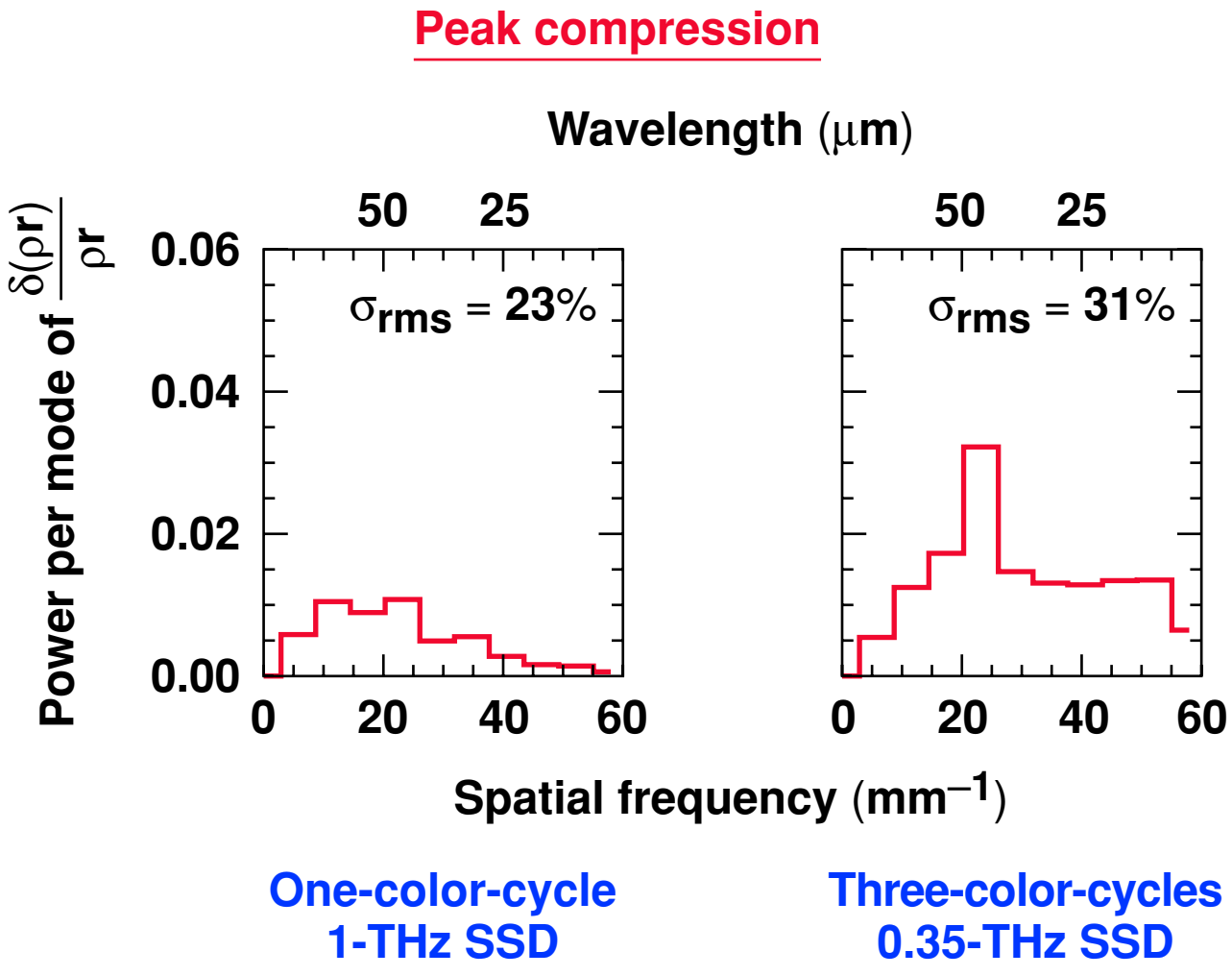
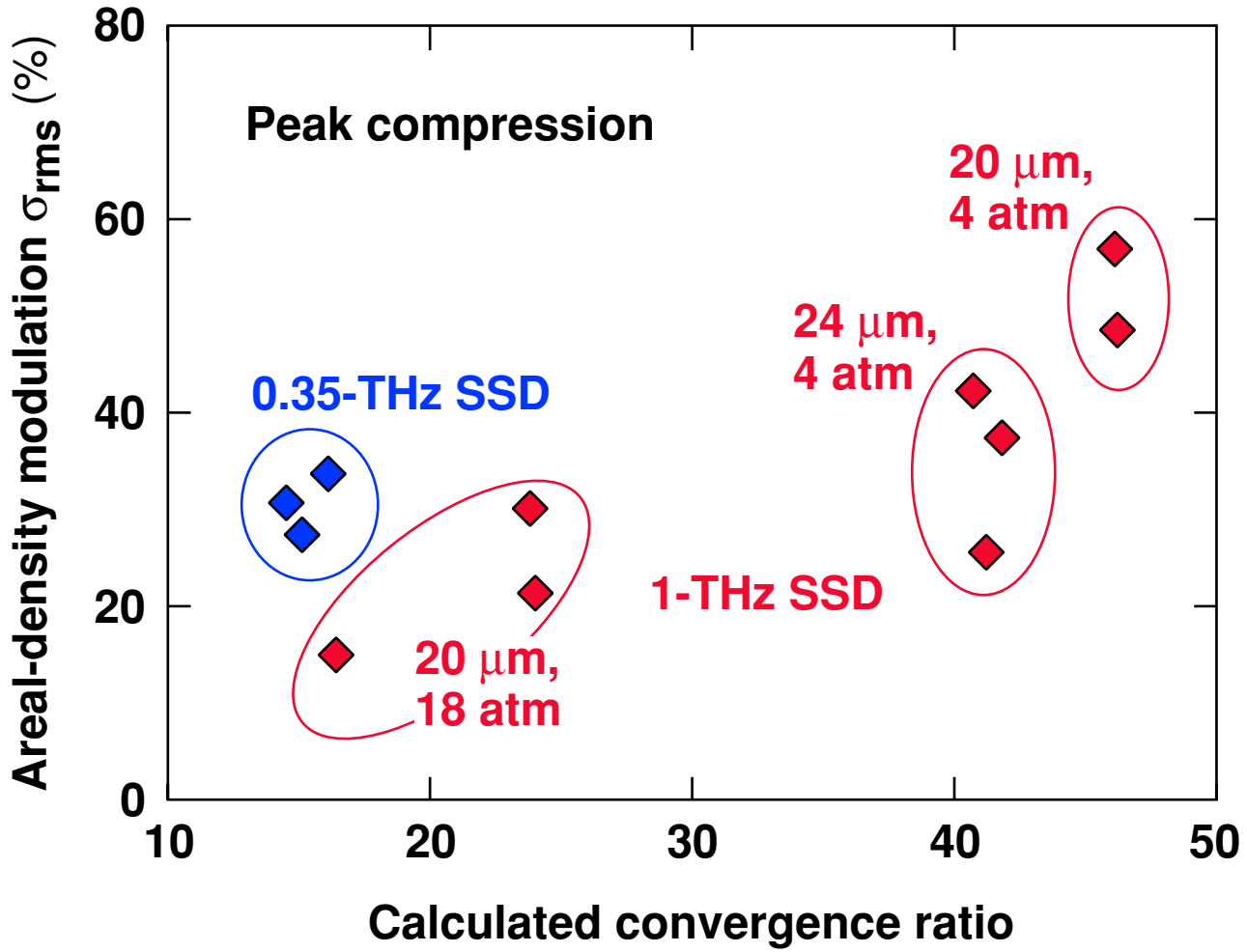
At peak compression, implosions with three color cycles, 0.35-THz SSD have slightly higher nonuniformity levels than those with one color cycle, 1-THz SSD



E11239

The shell-modulation level is higher with a higher convergence ratio in the deceleration phase of spherical implosions



E11240

Summary/Conclusions

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