

INTEGRATED OPTICAL PROBES

Abstract

Optical probes used in velocimetry measurements have typically been individual probes that collect data for a single diagnostic at a single point. These probes have been used in diagnostics such as VISAR, PDV, and radiometry, which measure surface velocity, temperature, and other characteristics. When separate probes are used for these measurements, the different diagnostic points measured must be significantly separated. We have developed integrated probes that collect data for multiple optical diagnostics; these probes measure focused points in close proximity.

T100EEU042307

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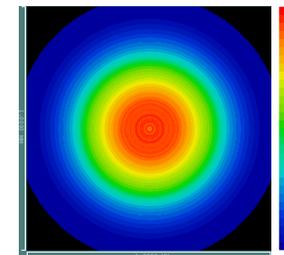
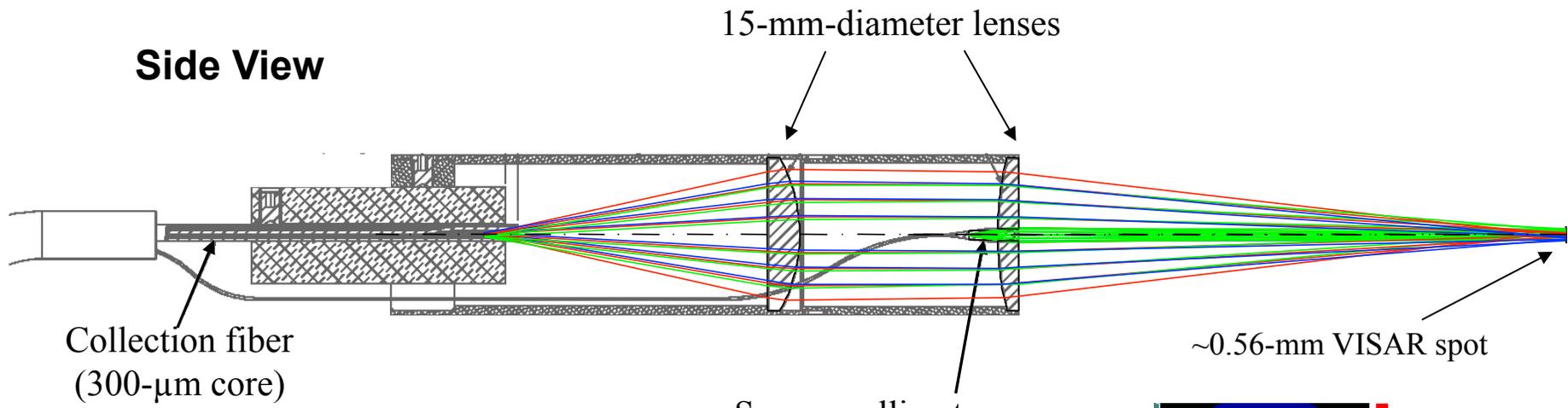
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Single 5/8-inch-diameter VISAR Probe



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BNL/AO 6928

Multi-fiber VISAR Probe

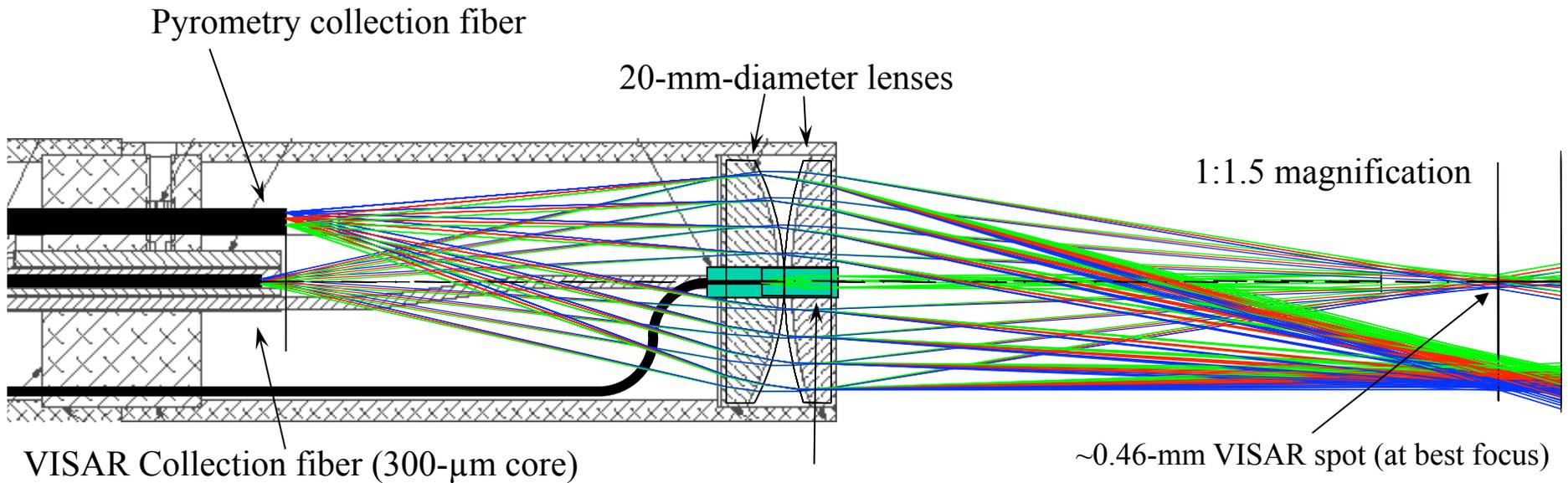


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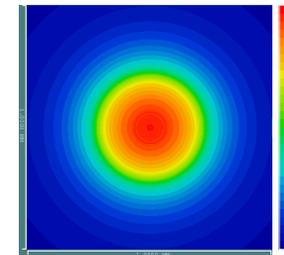
LAO T278

Combination Pyrometry/VISAR Probe (Armando)

Side View 7/8-inch-diameter housing

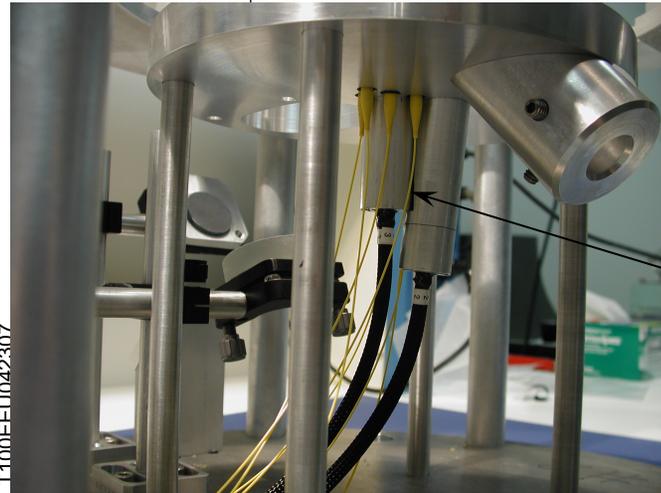
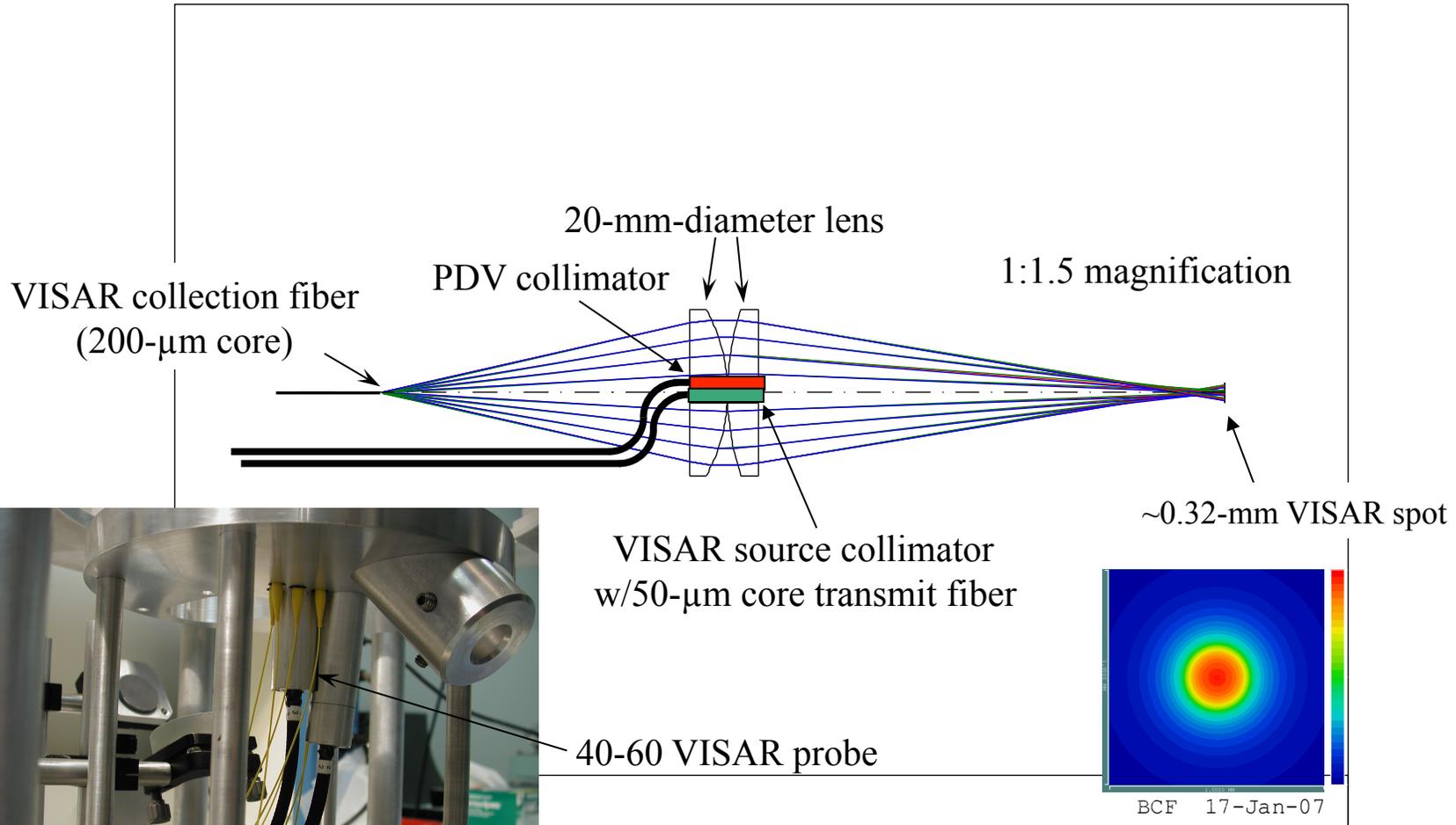


Source collimator
w/50- μm core VISAR transmit fiber

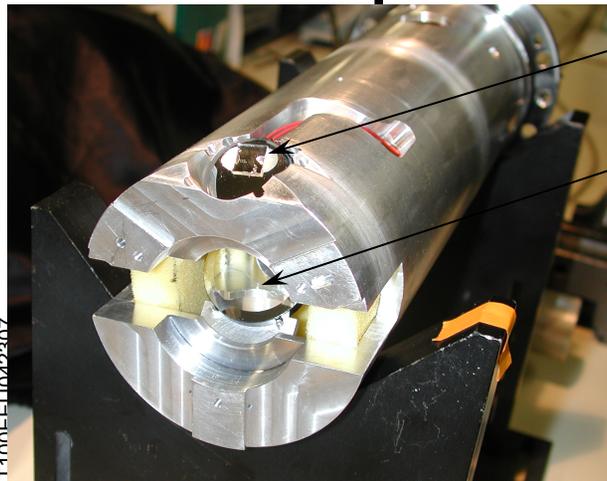
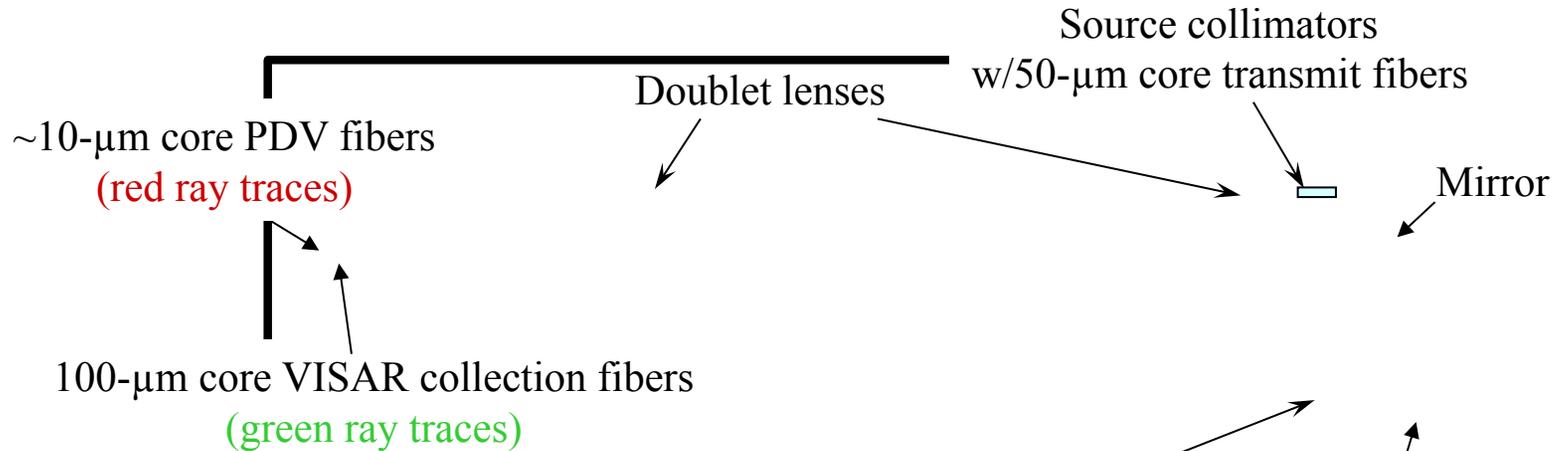


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Barolo PRAD 40-60 VISAR/PDV Probe



Thermos VISAR/PDV probes

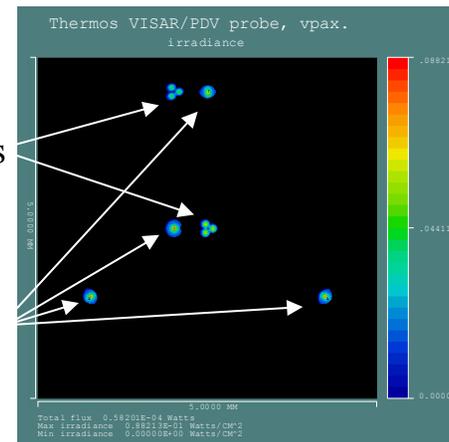


Mirror

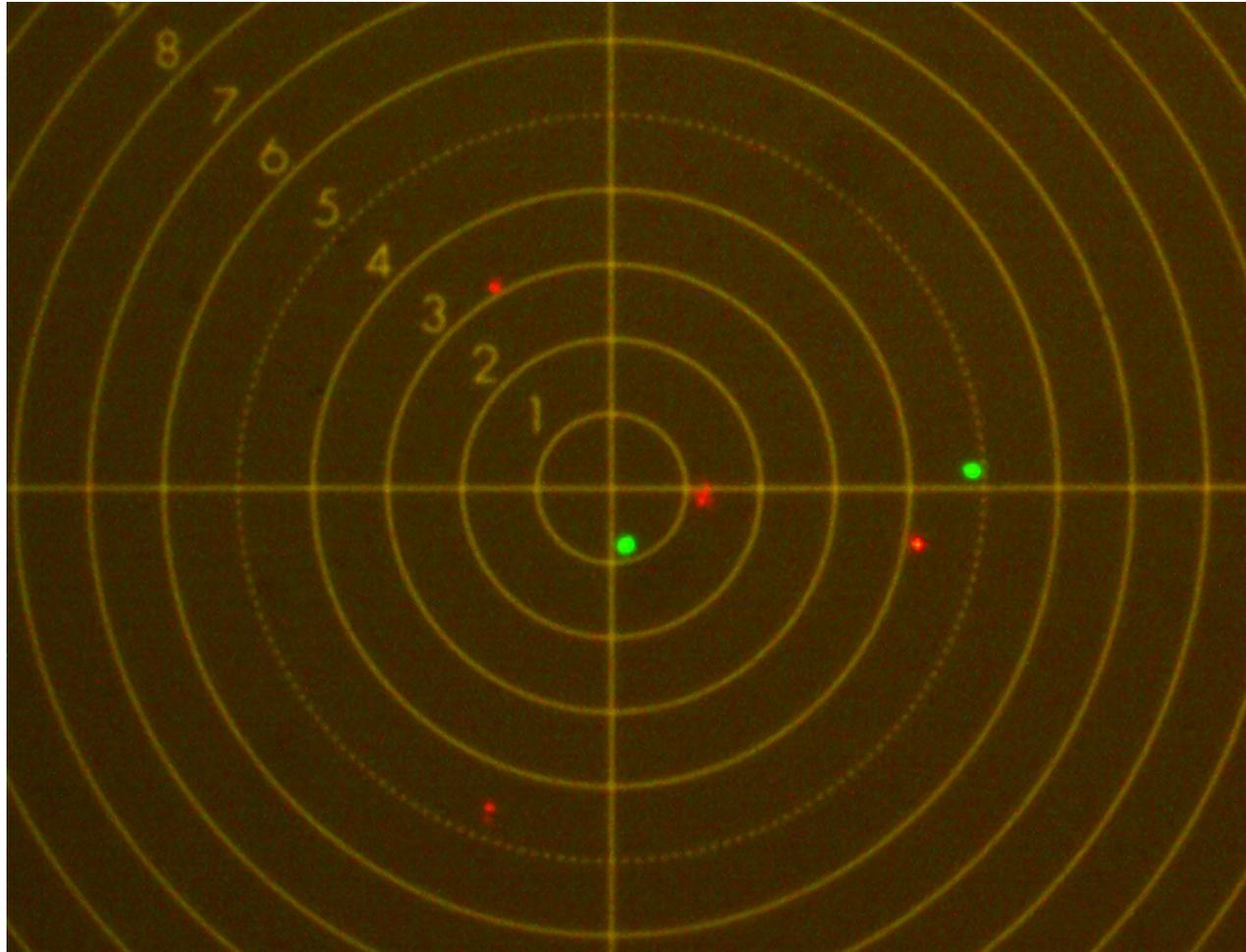
Pellicle

$\sim 0.10\text{-mm}$ VISAR spots

PDV spots



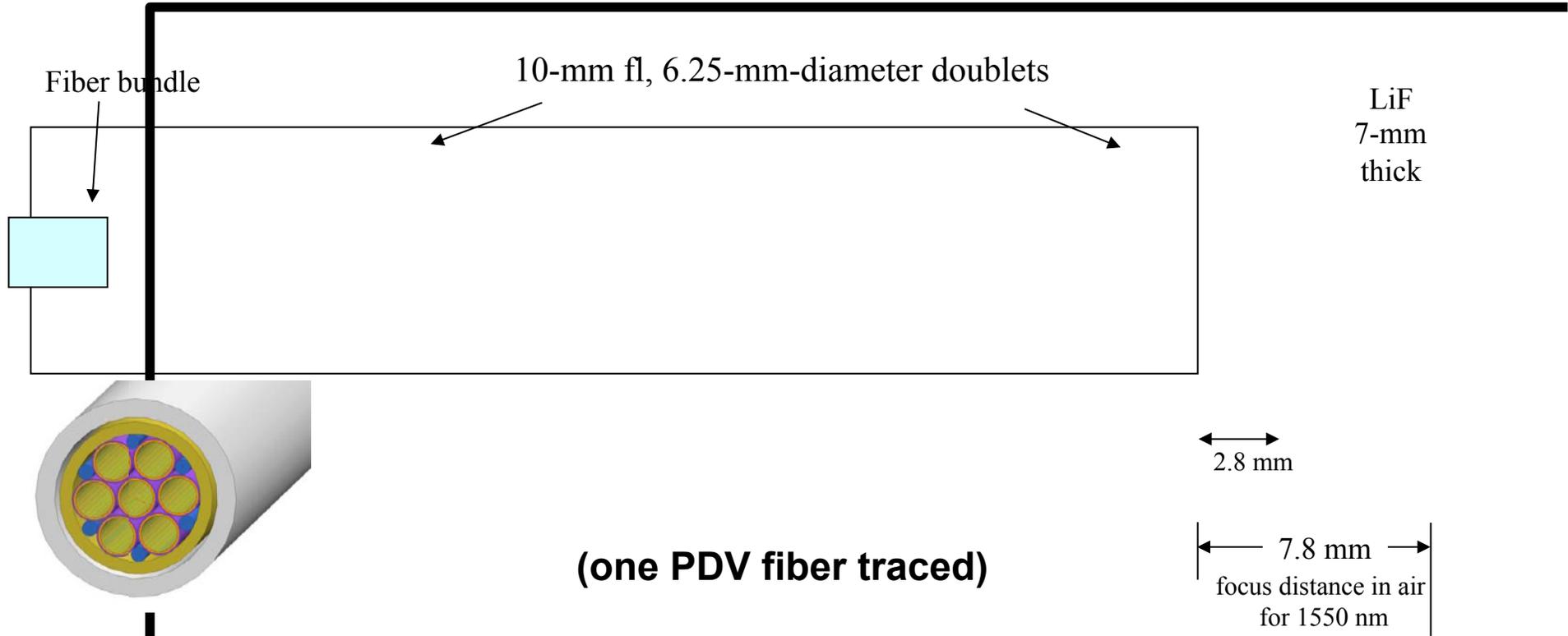
Thermos Alignment Reticule Image



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Ray Trace of Small PDV/Radiometry Probe

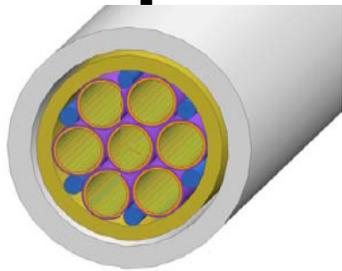
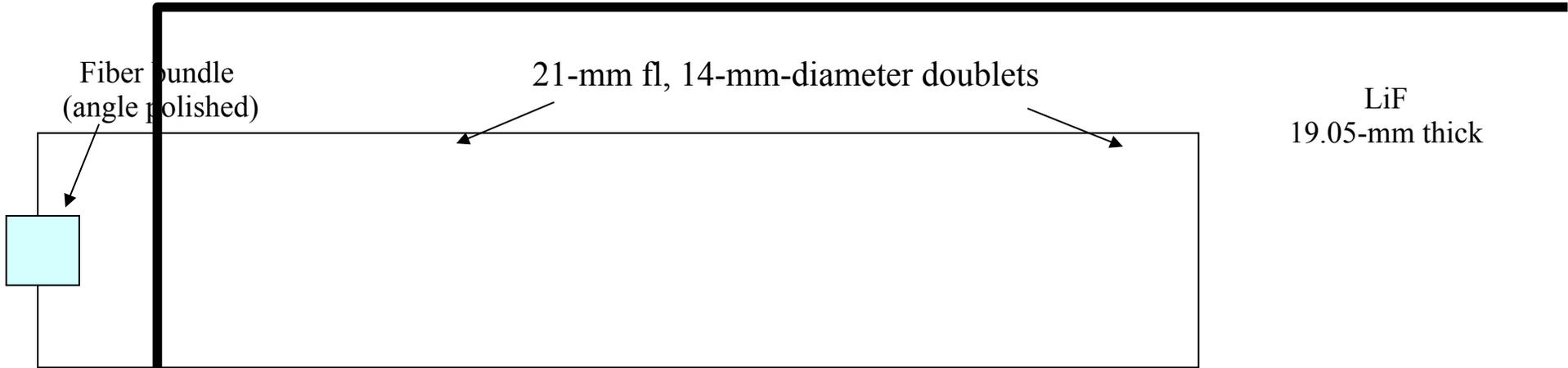
(two PDV and two Radiometer fibers traced)



7.5-mm focus distance in air
for 633 nm setup wavelength

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Ray Trace of Powder Gun PDV/Radiometry Probe (one PDV and three Radiometer fibers traced)



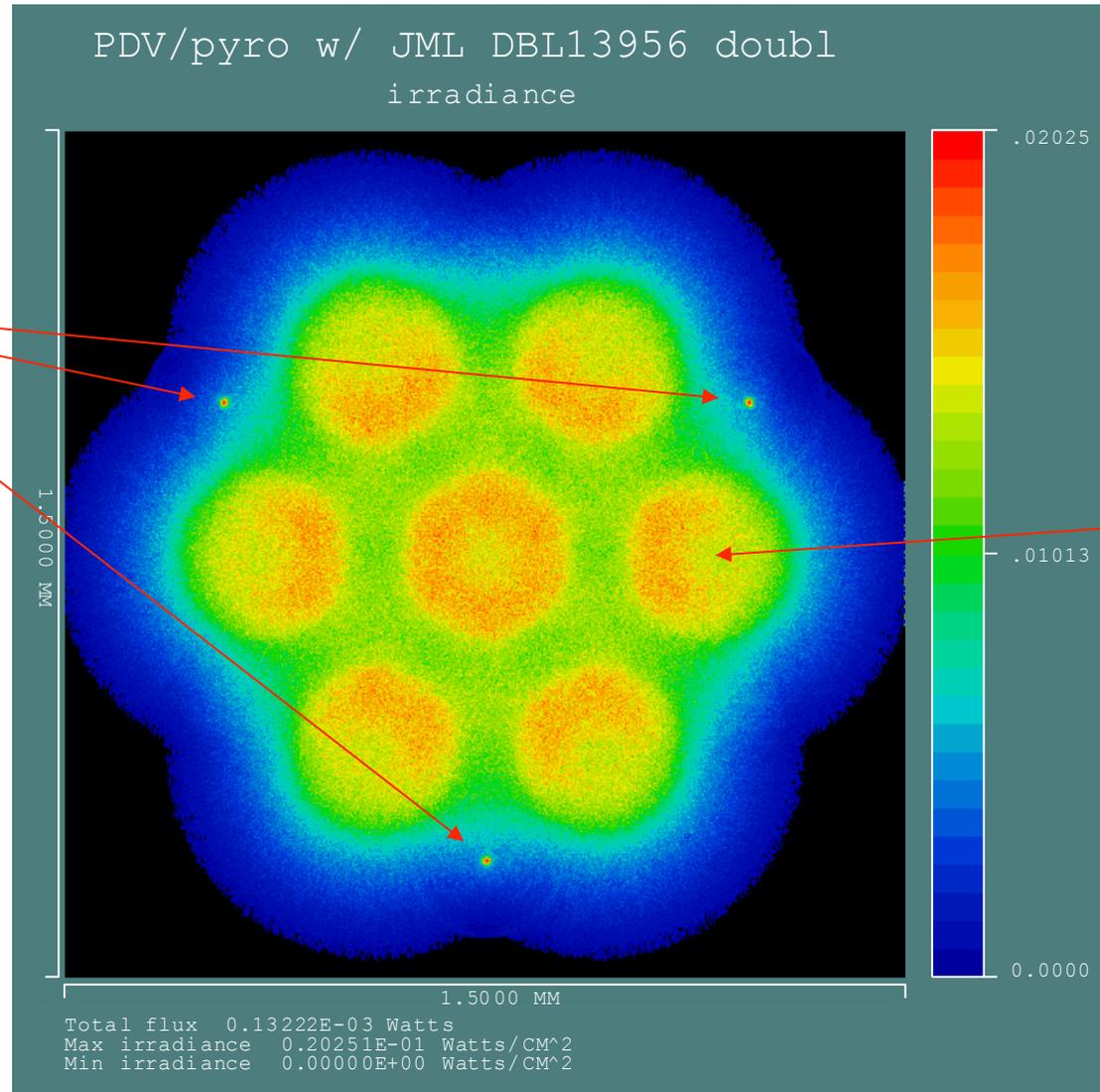
(one PDV fiber traced)

16.4 mm
focus distance in air
for 1550 nm

15.8-mm focus distance in air
for 633 nm setup wavelength

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Fiber Bundle Output Illumination Analysis at PDV Focus

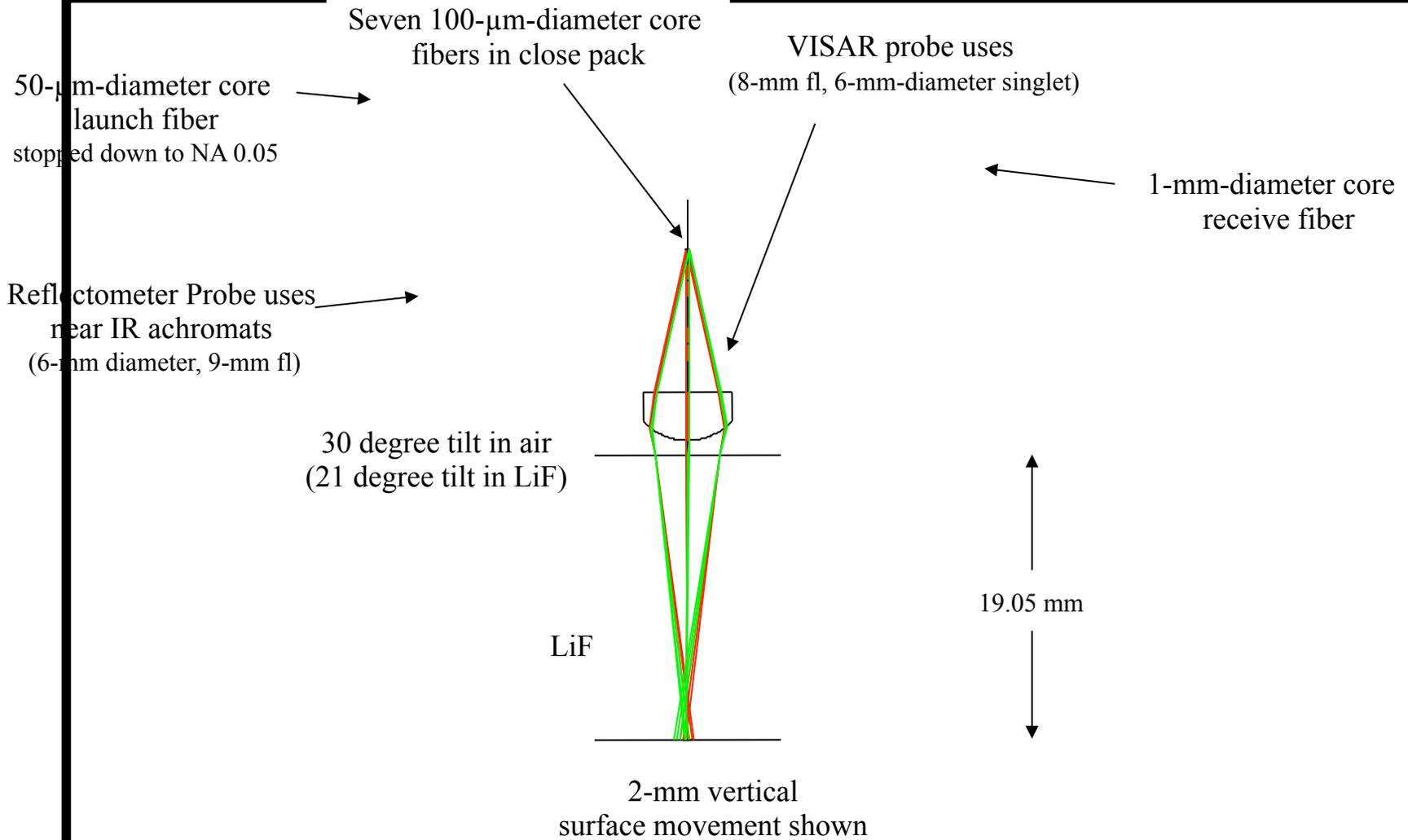


Three
PDV spots

Seven
Radiometer
spots

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Ray Traces of VISAR Probe (center) with Reflectometer Probe (at angle)



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Summary

Integrated Optical Probes

- (Armando) Pyrometry/VISAR Probe
- Barolo PRAD 40-60 VISAR Probe with built-in PDV Probe
- Thermos VISAR/PDV Probes
- Small PDV/Radiometry Probes
- Powder Gun PDV/Radiometry Probes
- Future VISAR/Reflectometry Probes

These probes measure focused target points that are in close proximity.