Spherical Cu Ka Crystal Imager (SCI)

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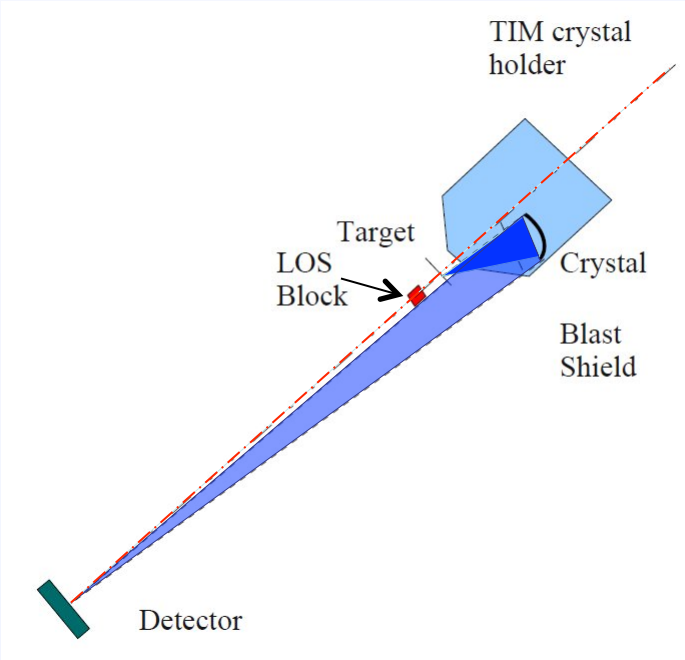
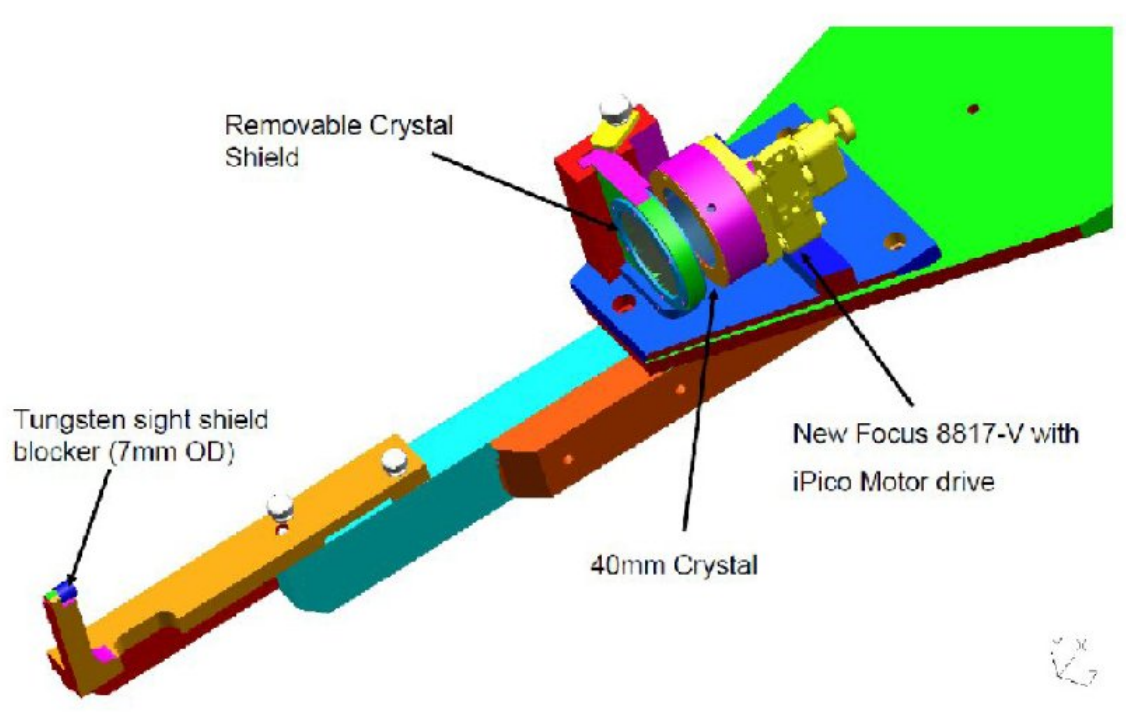
Spherical Cu Ka Crystal Imager was requested by the users and implemented on Omega and Omega-EP

- Scientific motivation
  - Monochromatic crystal image will be useful for studying fast-electron dynamics in fast-ignition experiment
  - It will be useful to study Ka brightness and spatial distributions
- Requirements
  - 8.05 keV Cu Ka monochromatic imaging
  - spatial resolution 10-20 mm
- Findings and recommendations
  - 2 systems are installed : both on EP and Omega
  - Many experiments were performed by Stoeckl, Nilson, Fiksel, Sawada and Wei
  - EP system works well
  - Omega-only shots works well
  - Joint shots had background problem when the EP laser E was >250J
  - CCD detector (instead of IP) is desired

Implementation: SCI needs 2 TIMS: one to hold the crystal and the LOS blocker the other to hold the image plate detector

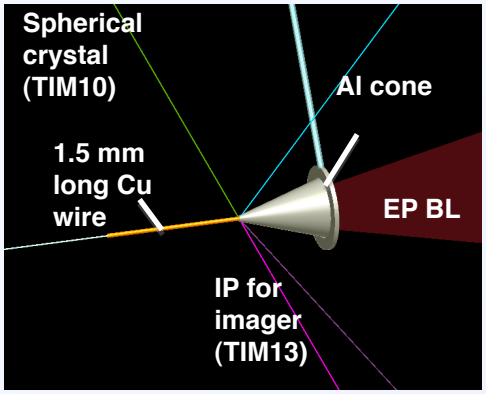


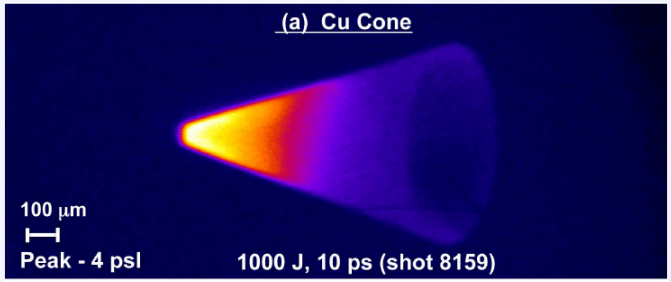


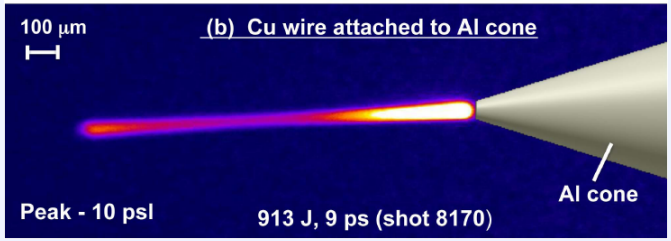
- Requires 2 opposing TIMS
- The crystal on a motorized tip-tilt stage.
- A blast shield protects the crystal from target debris.
- The blast shield can be removed for alignment.
- A direct line of sight block made of tungsten protects the detector from x-ray background emitted by the target.

Research Highlights: Sawada and Wei teams successfully utilized the SCI on Omega and Omega-EP; data is high quality

Study of fast-electron transport on EP (H. Sawada and team)

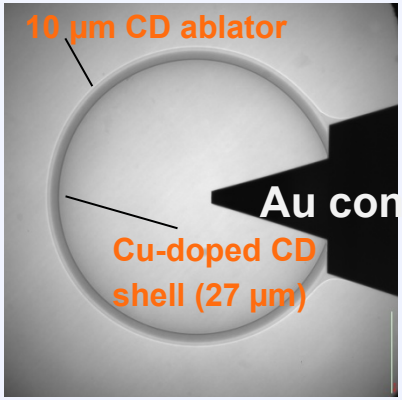


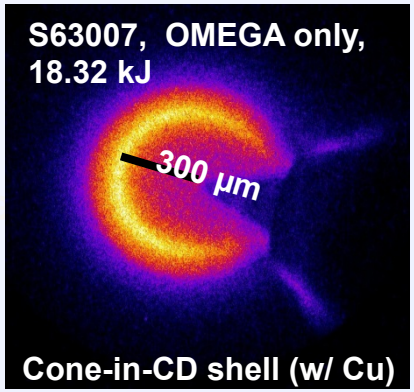


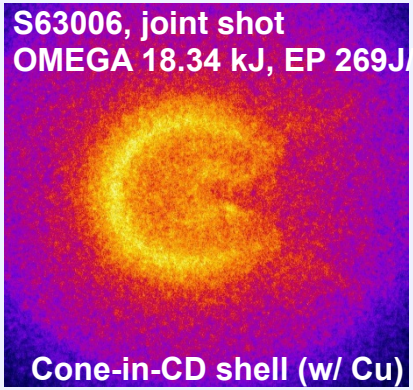


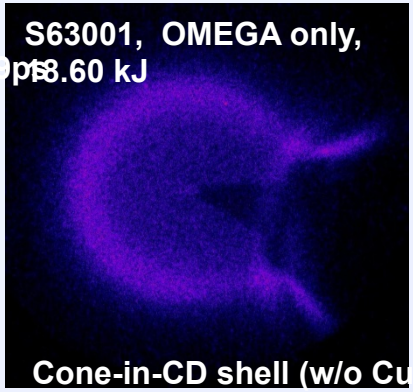
H. Sawada et al., IEEE Transactions on Plasma Science, Accepted for publication (2011).

Study of fast-ignition implosion on Omega +EP Joint shots (M. Wei and team)









- Omega-only shots worked well
- High background for high energy EP joint shots.