RITS-6 Paraxial Diode Plasma Diagnostics

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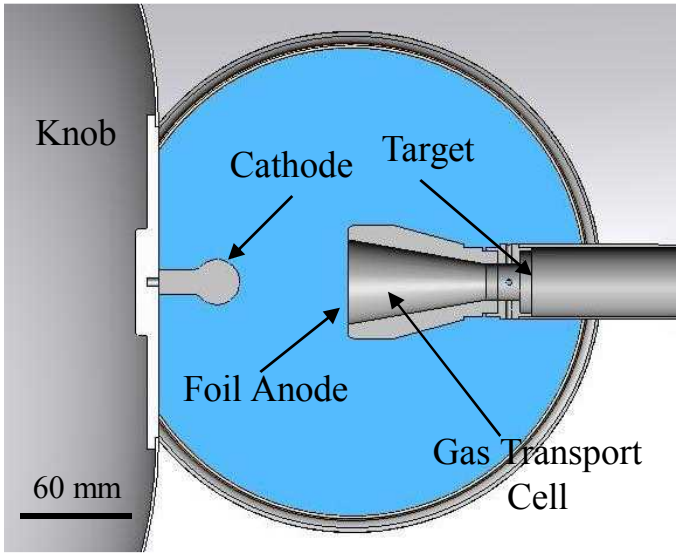
Paraxial Shot Sequence

Shot 310: 45mm long, 20mm diameter Al cathode,
0.014mm Al foil anode, 40mm A-K gap, and 0.9mm Ta target.

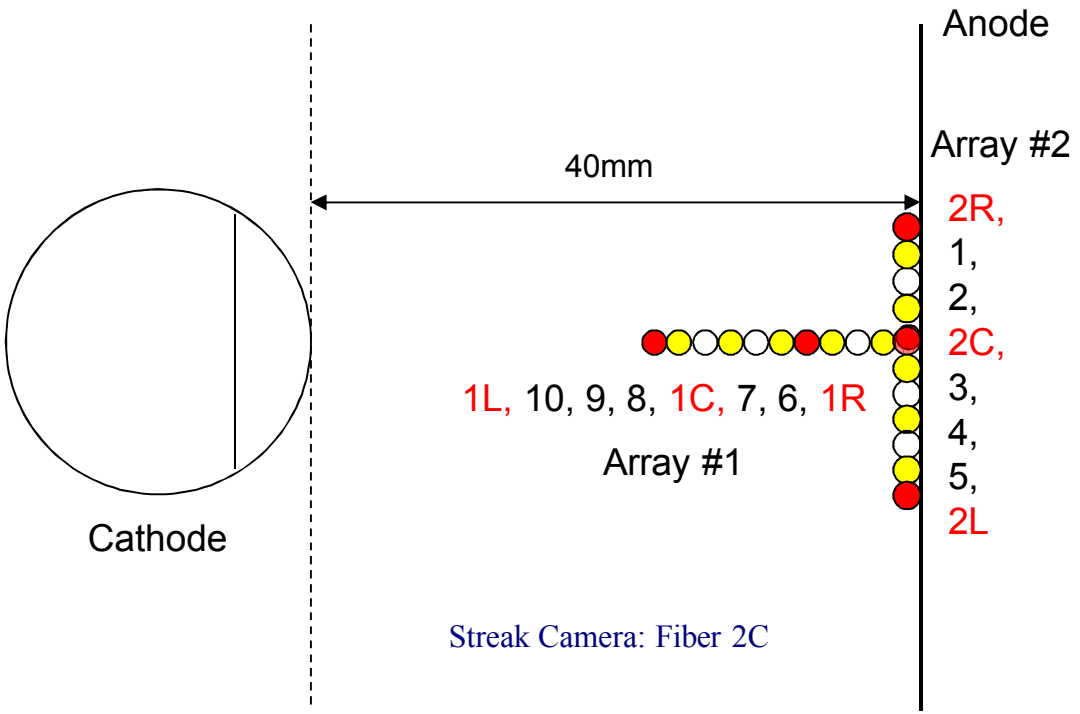
Shot 311: 45mm long, 20mm diameter Al cathode,
0.014mm Al foil anode, 35mm A-K gap, and 6.0mm Al target.

Shot 312: 45mm long, 20mm diameter Al cathode,
0.012mm Al-Mylar foil anode (mylar on vacuum side), 40mm A-K gap,
6.0mm Al target.

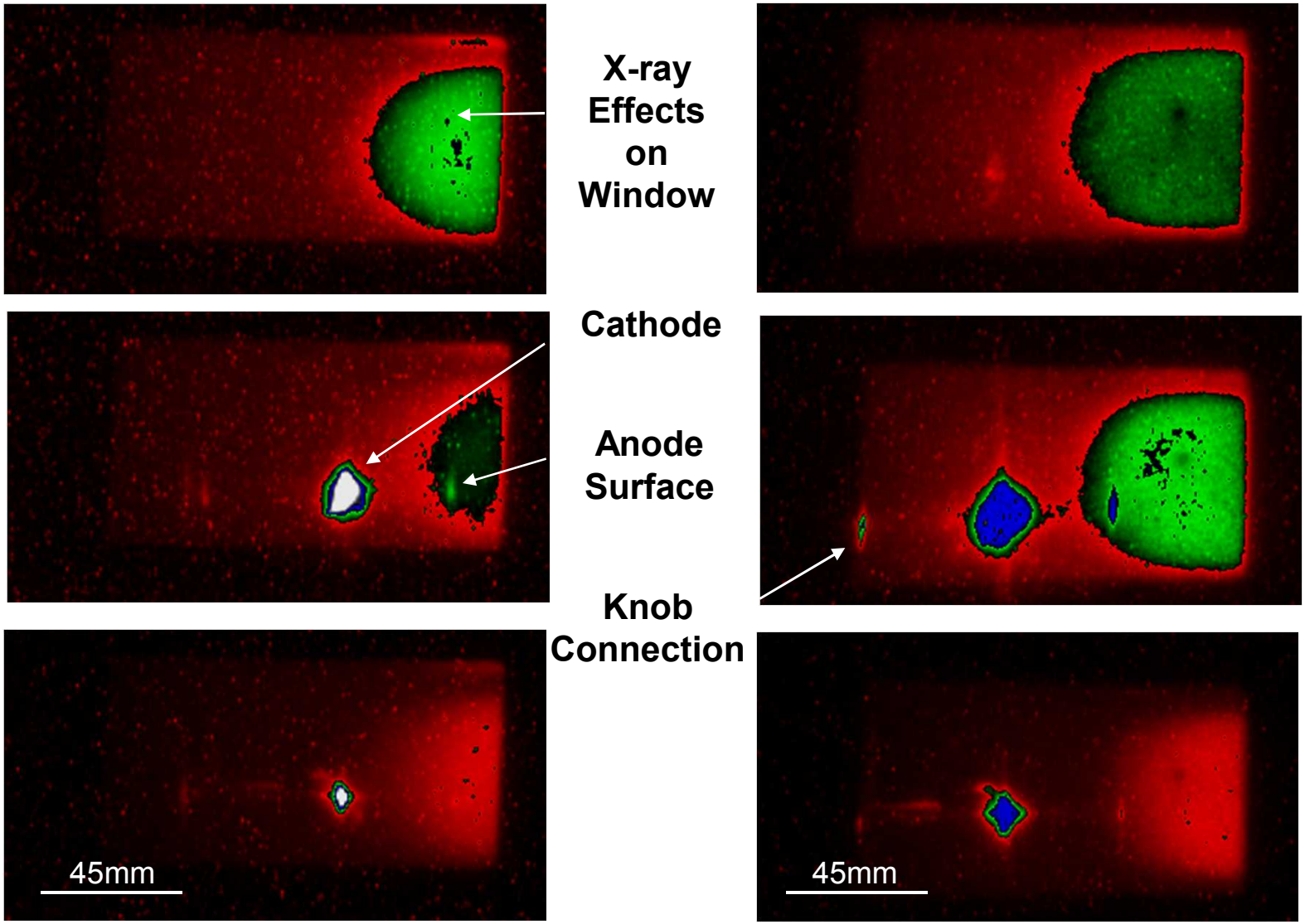
Fiber Orientation for Paraxial Diode Experiments



Standard Paraxial Diode Configuration

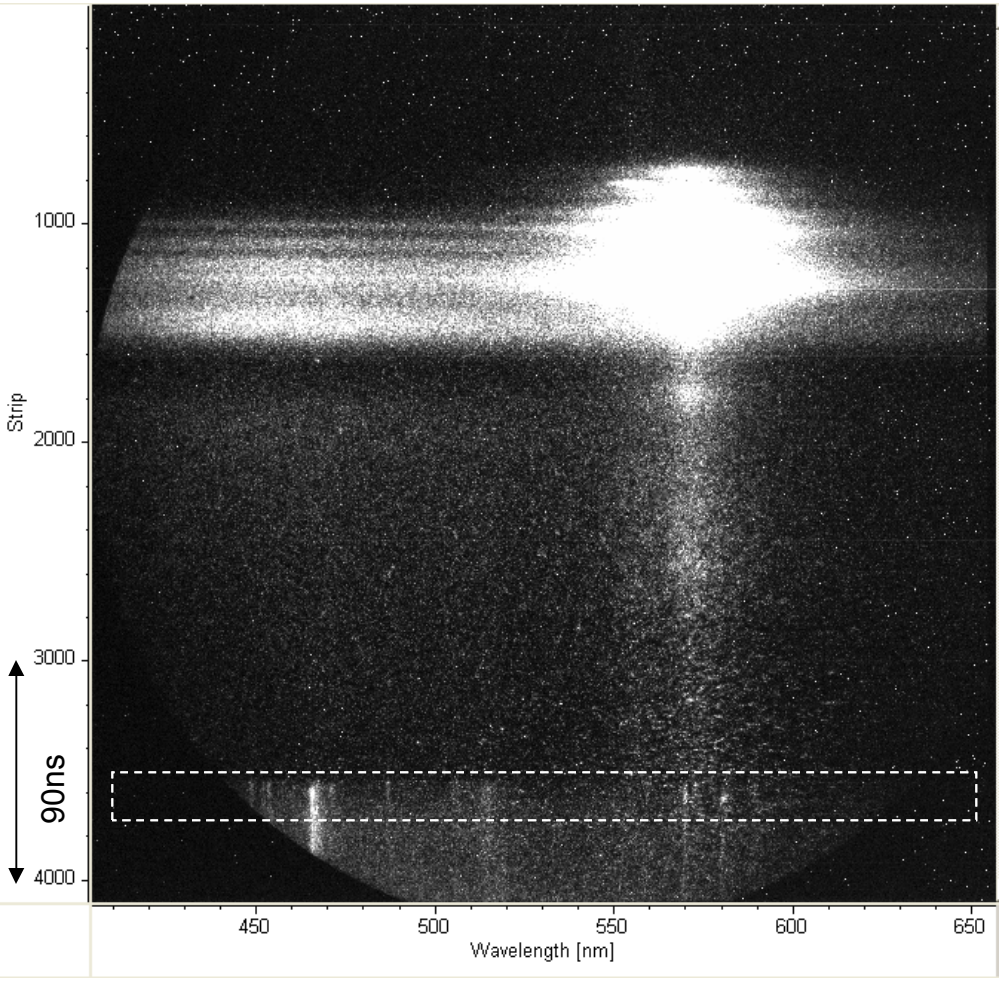


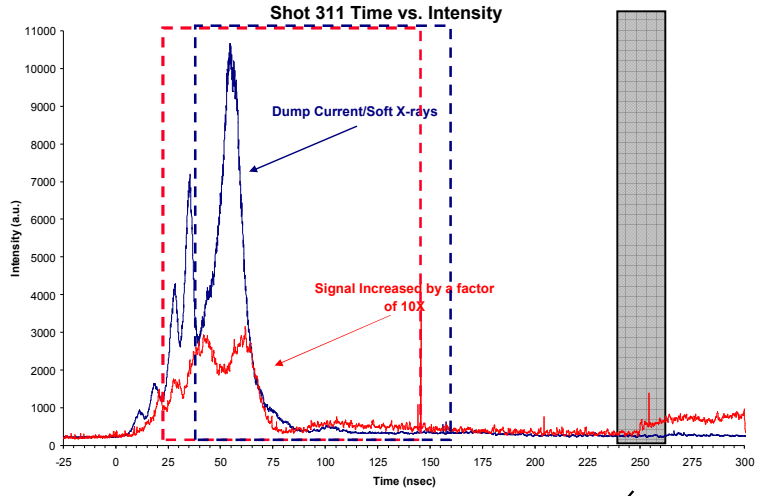
Photek Gated Images of Plasma Formation in Vacuum Region of Paraxial Diode

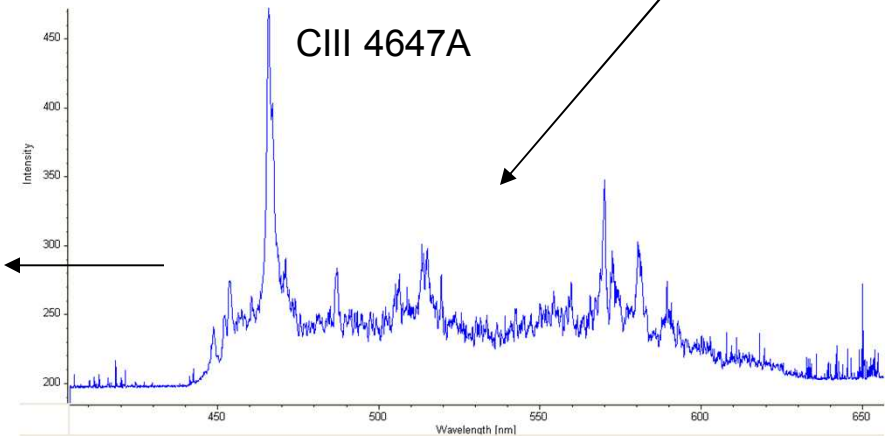


100-125ns Gated Images

Paraxial Diode Shot 311 Streak Camera Data





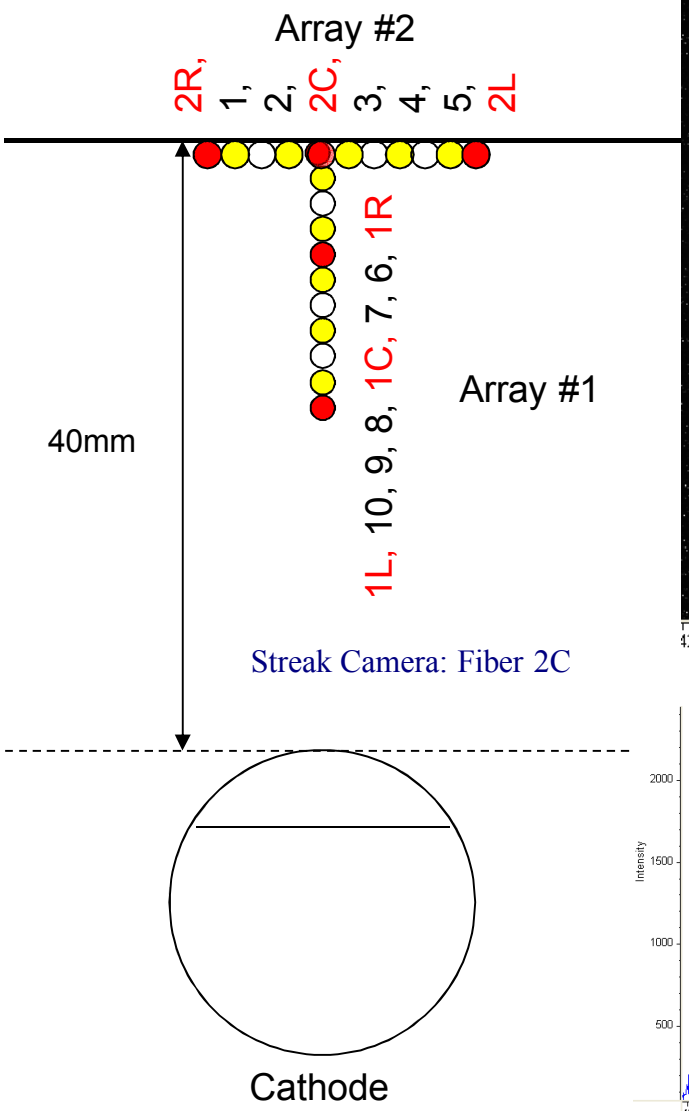


45mm long, 20.0mm diameter, Al cathode w/ silver tip, and 35.0mm A-K gap

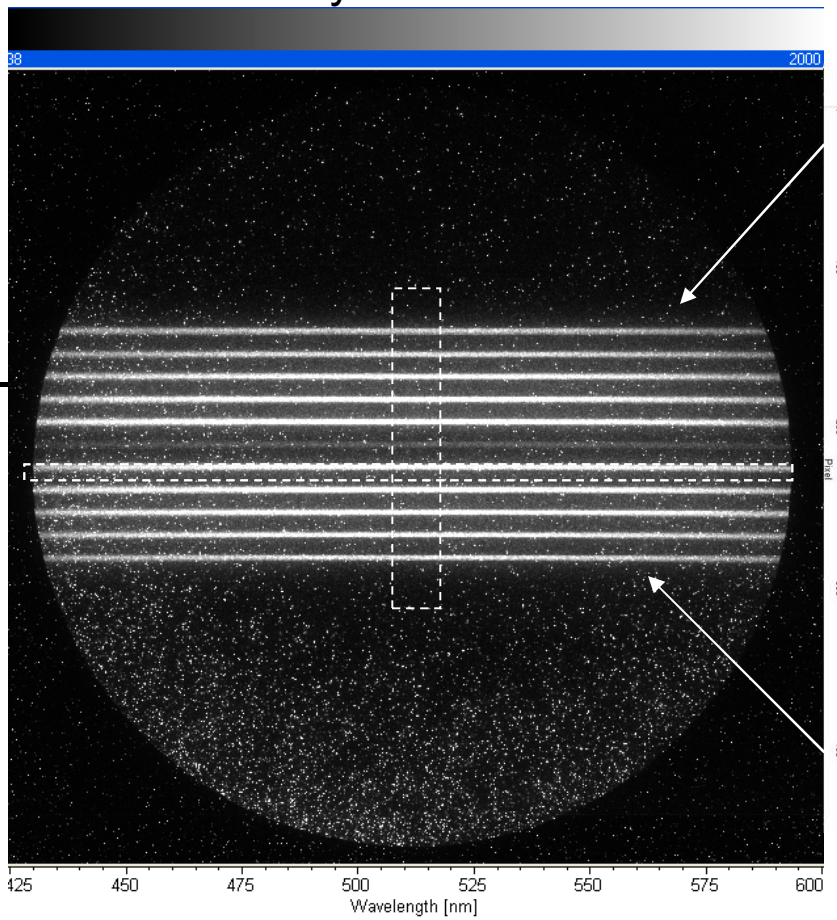
14ns gap between radiation pulse and continuum plasma.
Continuum plasma lasts for 164ns before start of ablation plasma

380ns Streak Camera Image
Fiber 2C Centerline
Anode Foil
Impulse Marker plus Scintillating Fiber

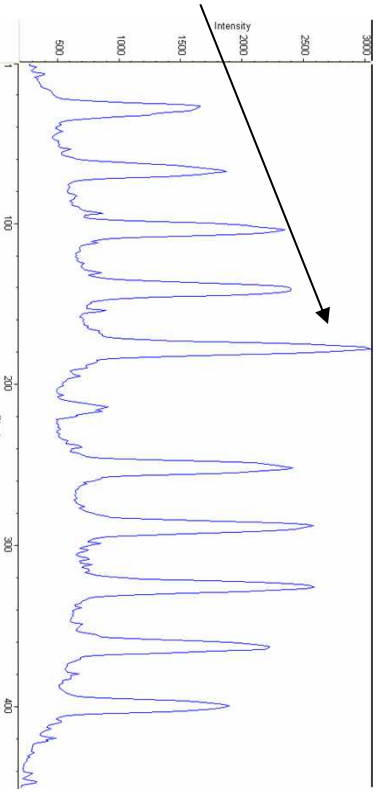
Shot 312
Paraxial Diode

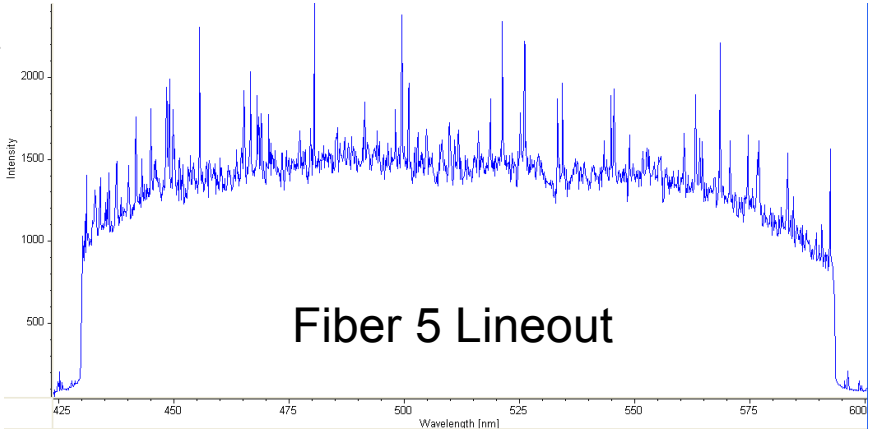


X-ray Scintillation



Plasma

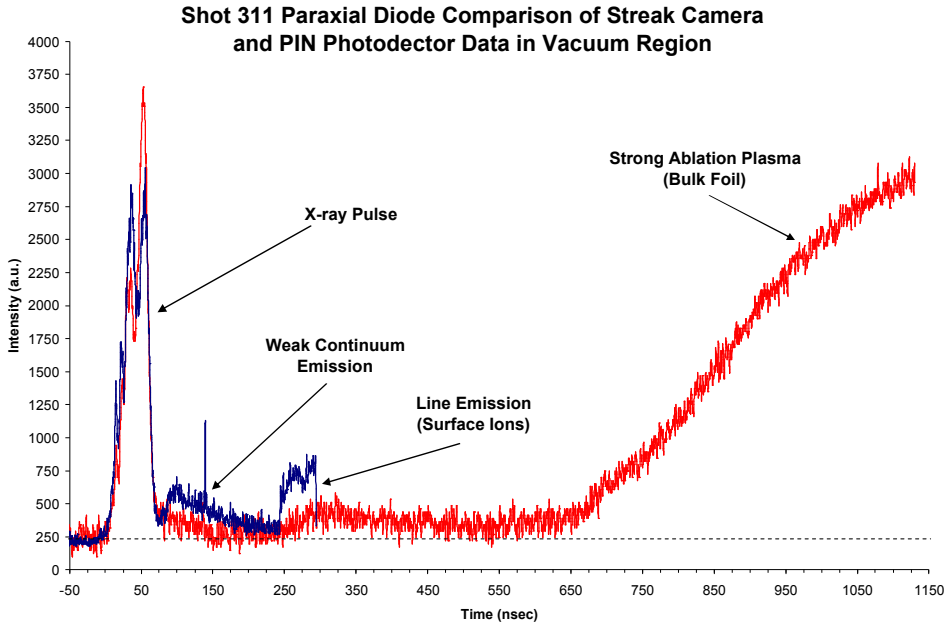


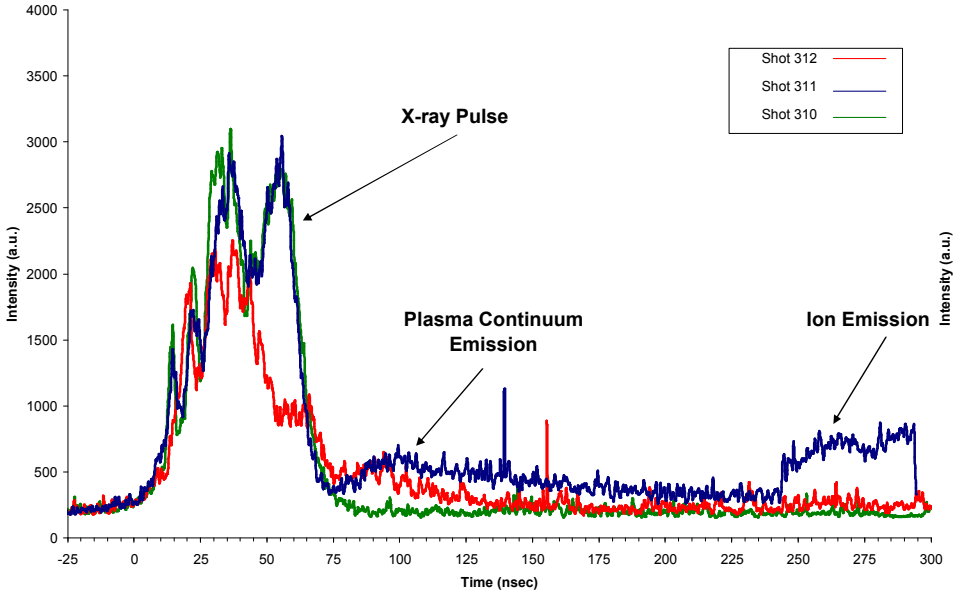


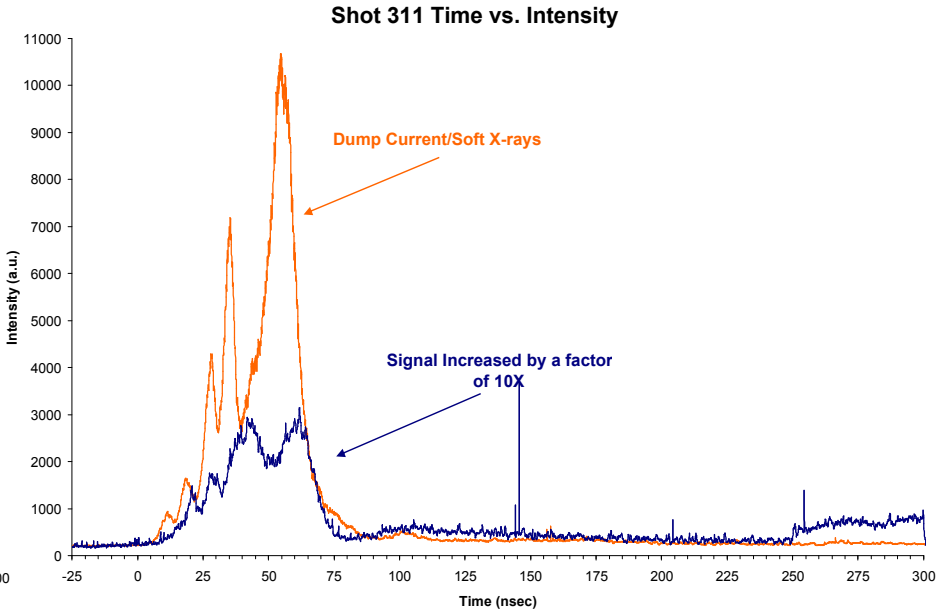
Gate: 125ns
Gain: 175
Delay: 2125ns

Foil Plasma Emission from Paraxial Diode

- Plasma emission from the foil anode is observed following the beam pulse
- Shortened A-K gap increases plasma emission

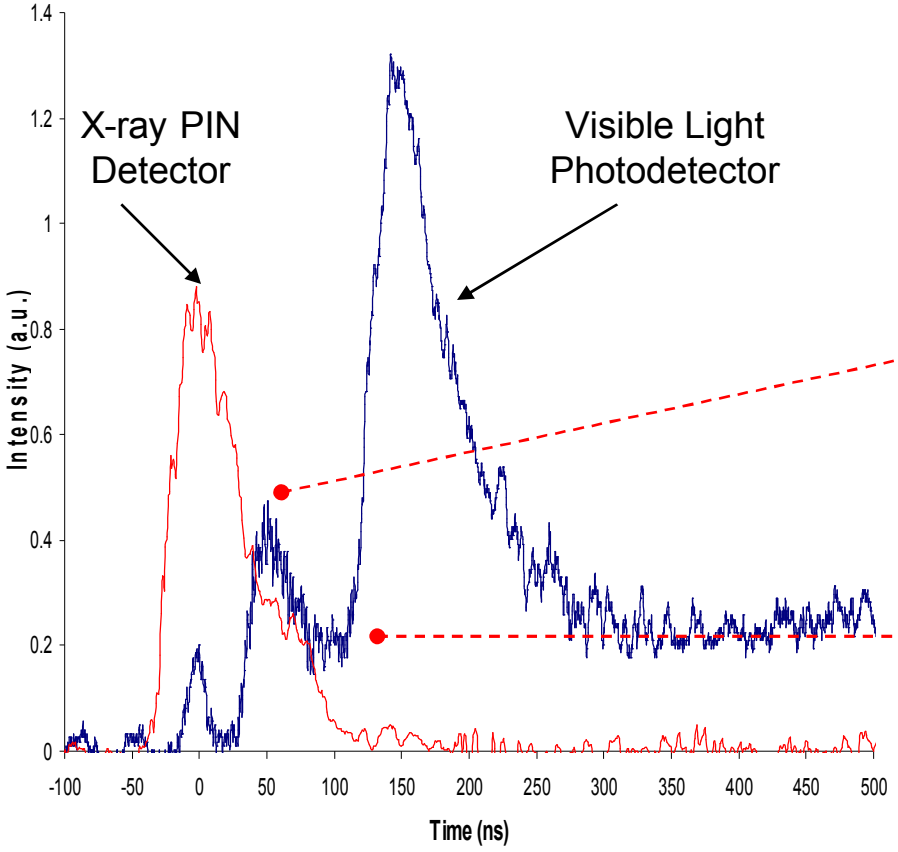


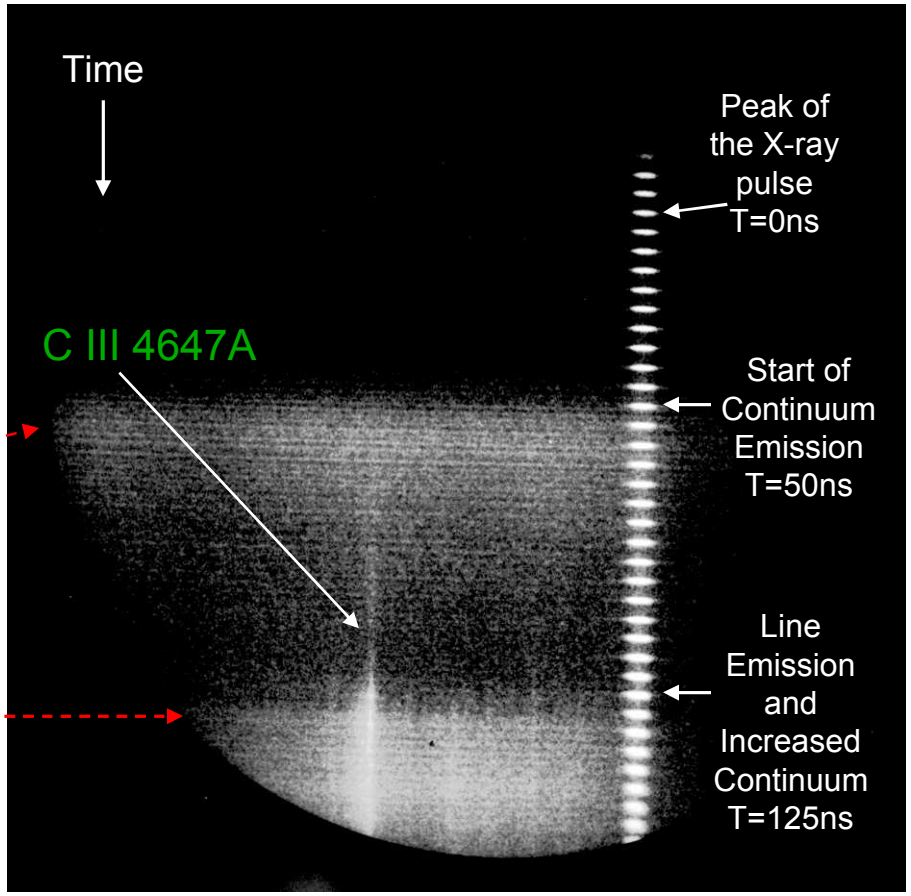




RITS-3 Anode Foil Plasma Formation for Standard Air-Filled Paraxial Diode

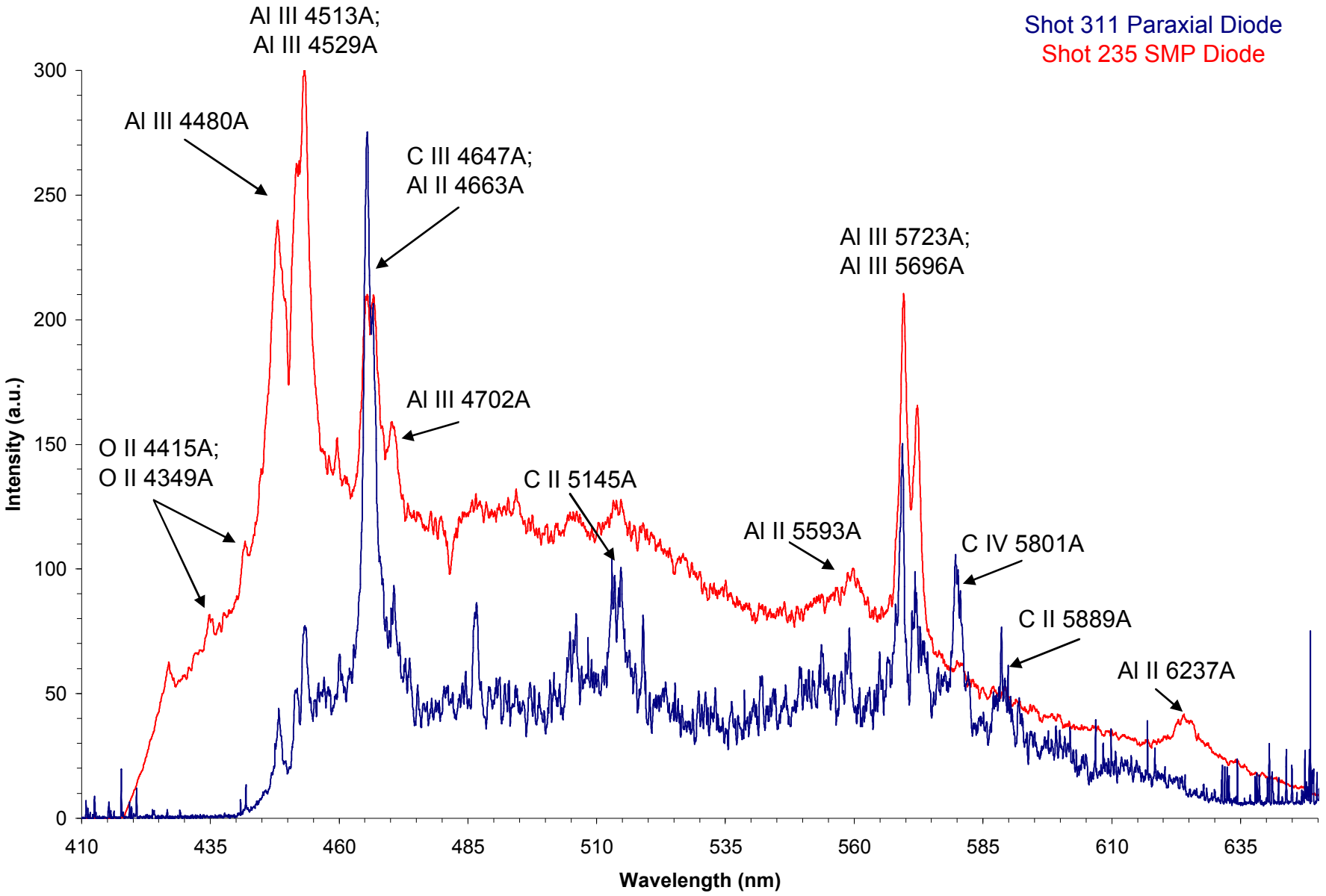
Shot 788: 25mm long, 10mm diameter Stainless Steel cathode, 0.025mm Al foil anode, 17mm A-K gap, and 25mil Ta target





Both the streak camera and photodiode indicate plasma production from the aluminum anode foil.

Paraxial Diode Foil Emission Spectrum



Summary and Conclusions

- Plasma ion emission from foil anode observed and measured
- Ions are primarily from surface carbon layers on anode foil
- Ions develop faster with shortened A-K gap
- Diagnostics allow for observation of plasma development in A-K gap region
- Spatial and temporal profiles of plasma ion emission recorded
- Bright plasma region on anode (supported by RITS-3 data)
- Cathode plasma formation observed