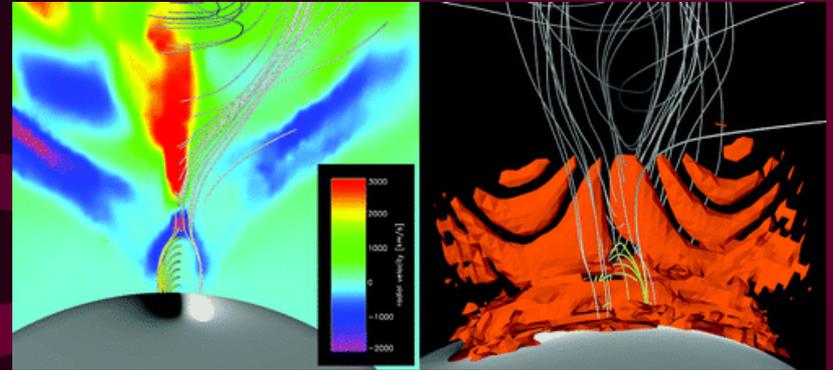


**STEREO-SOHO observations of
a post-CME ray:
evidence for a current sheet**

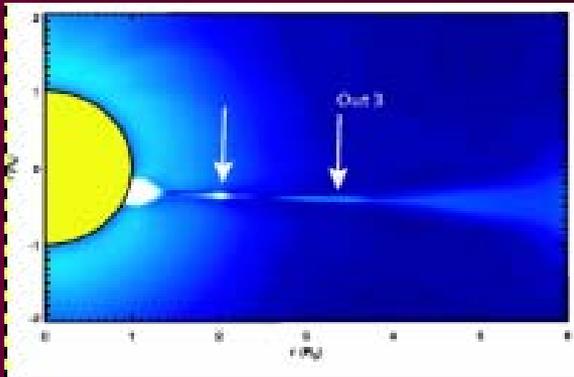
*Spiros Patsourakos (Univ. of Ioannina)
Angelos Vourlidas (NRL)*

All CME models predict post-CME Current Sheets

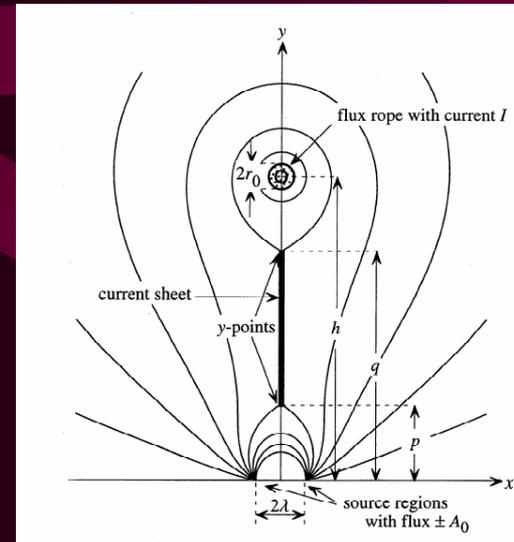
Post-CME CS should be aligned with the CME and occupy a much smaller volume



Lynch et al. 2004



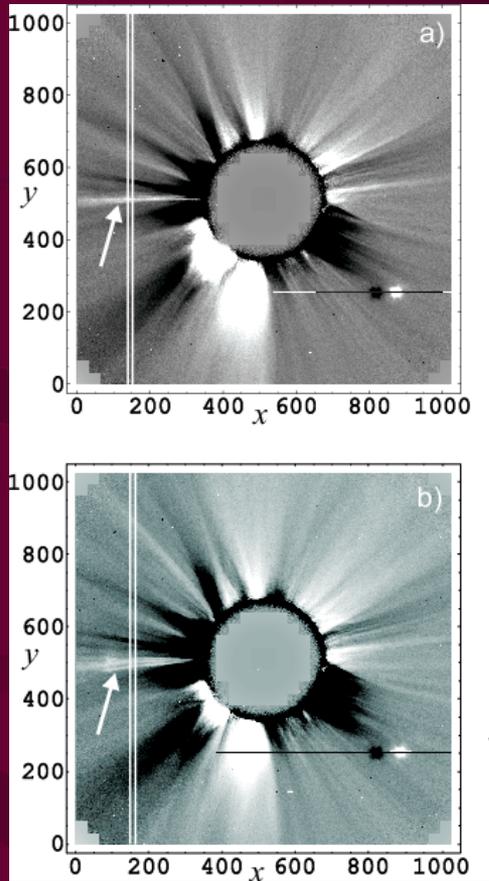
Riley et al. 2007



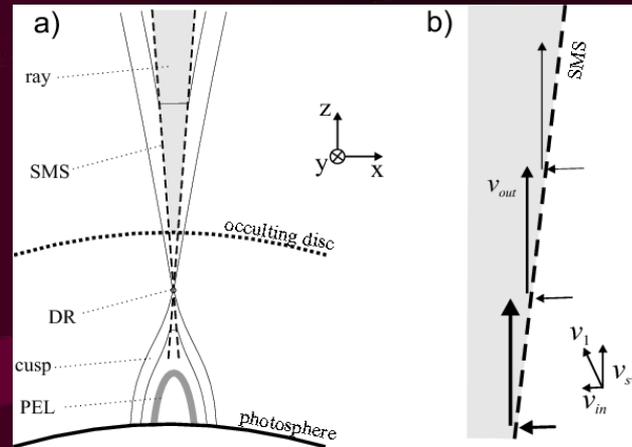
Lin & Forbes 2001

Post-CME rays in Coronagraph Images

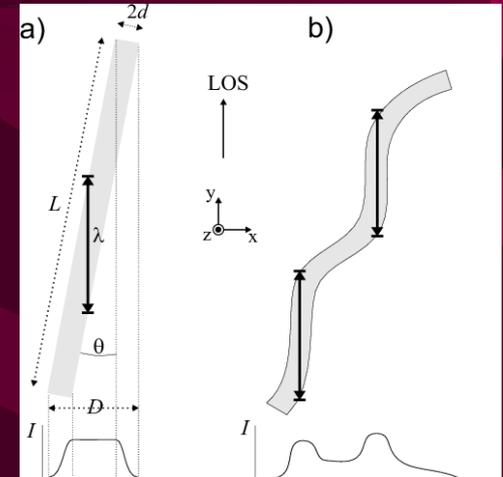
From Vrsnak et al (2009)



LASCO Observations



Nominal Ray Geometry



Ray Geometry to account for coronagraph observations

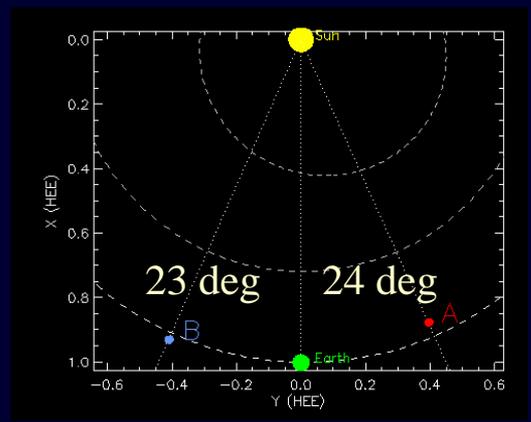
Goals

Questions to address with SECCHI observations

- 3D properties of ray-like features?
- How do they compare with 3D properties of CME ?
- How do they link to the source region ?

First Event:

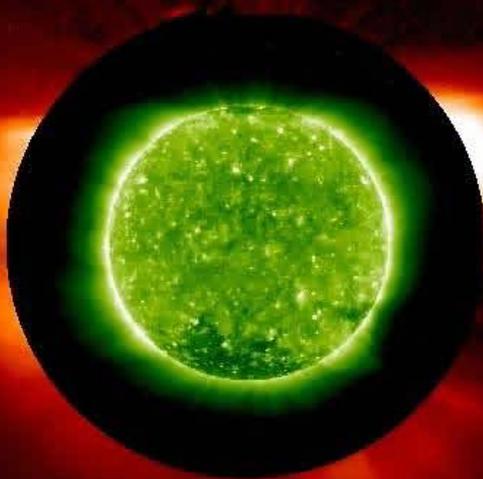
STEREO 3D analysis of the 'cartwheel' CME (9-April-2008)
and of a post-CME coronal ray



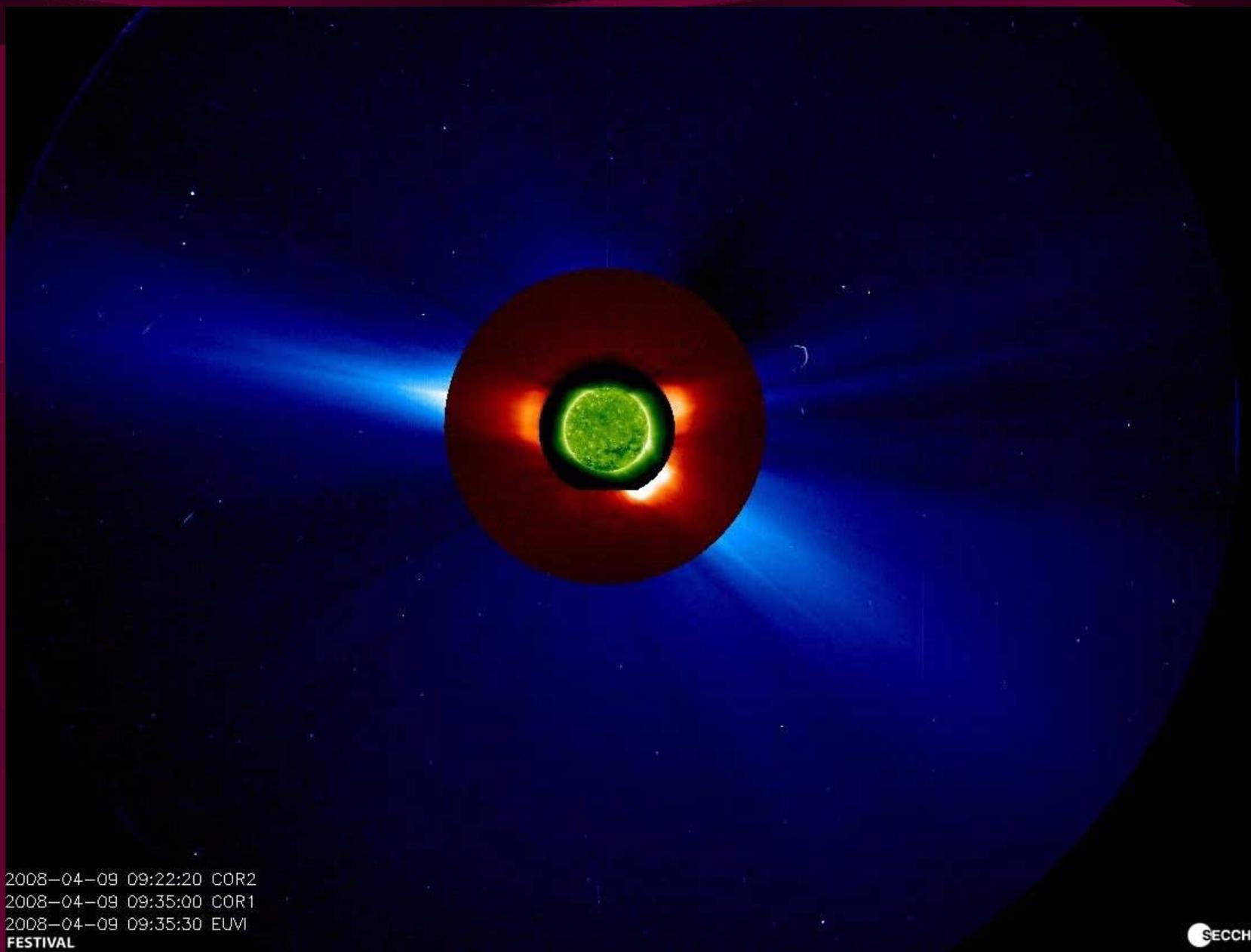
CME in Low Corona

SECCHI-B

SECCHI-A

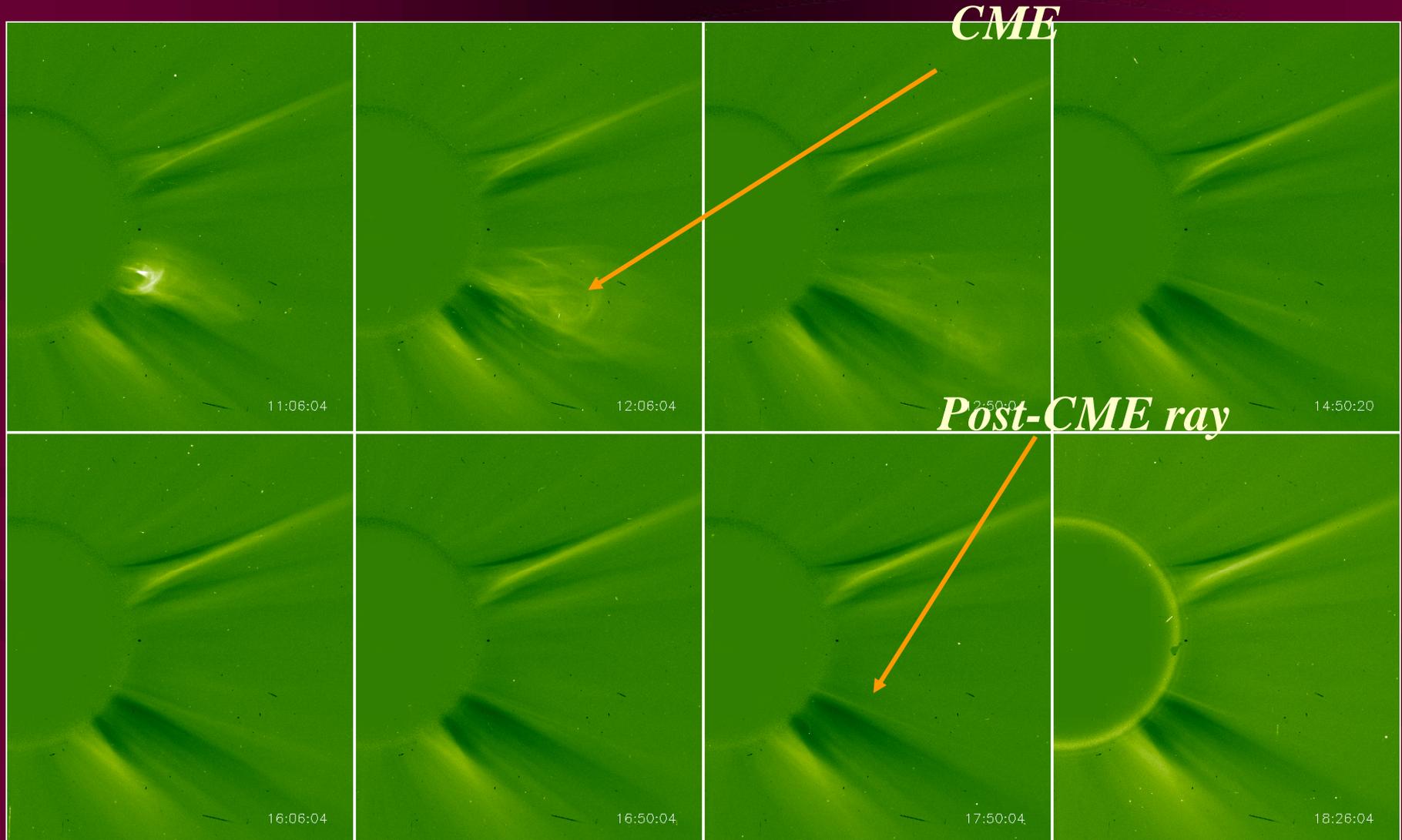


CME in SECCHI-A

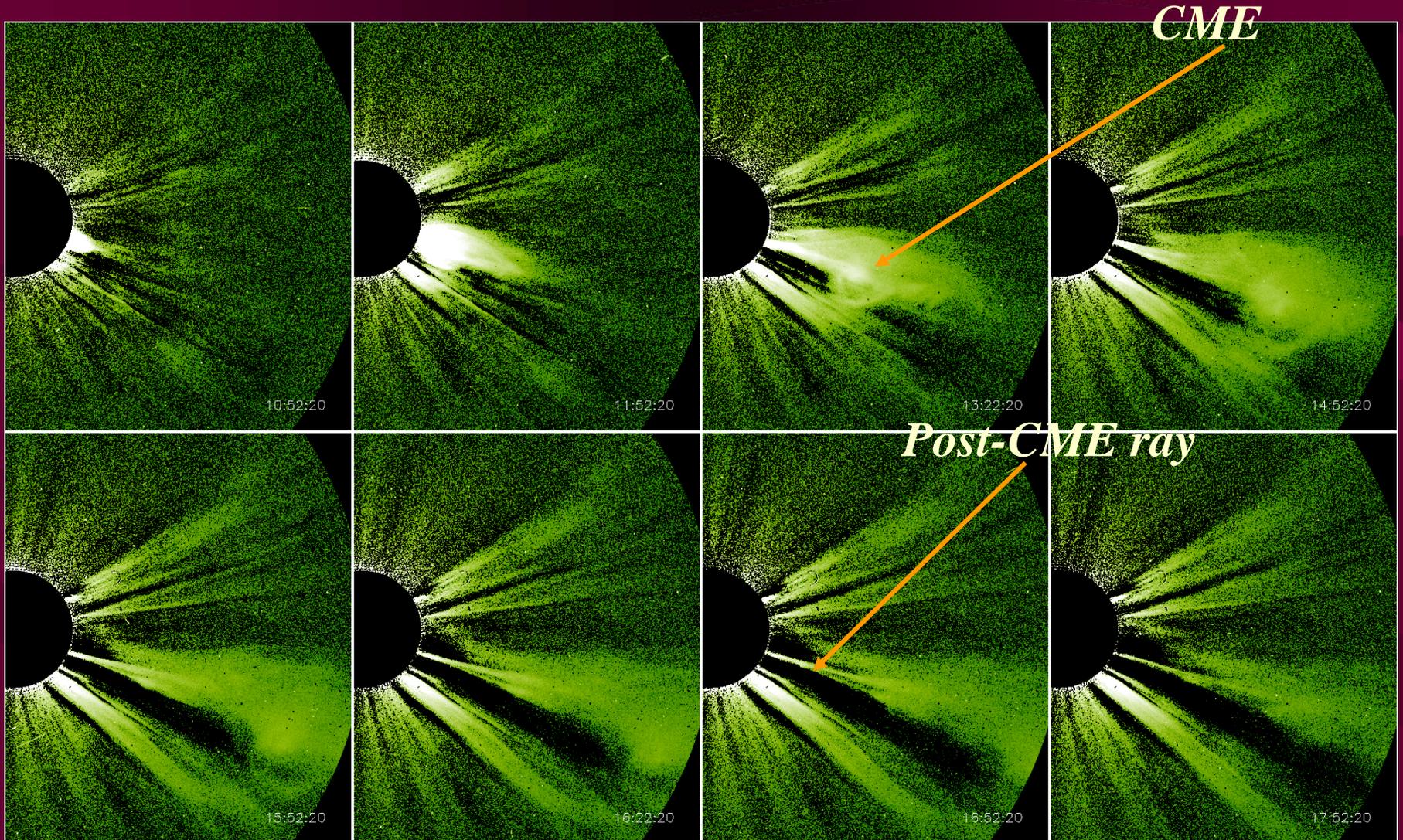


2008-04-09 09:22:20 COR2
2008-04-09 09:35:00 COR1
2008-04-09 09:35:30 EUVI
FESTIVAL

LASCO C2 Observations



COR2/A Observations



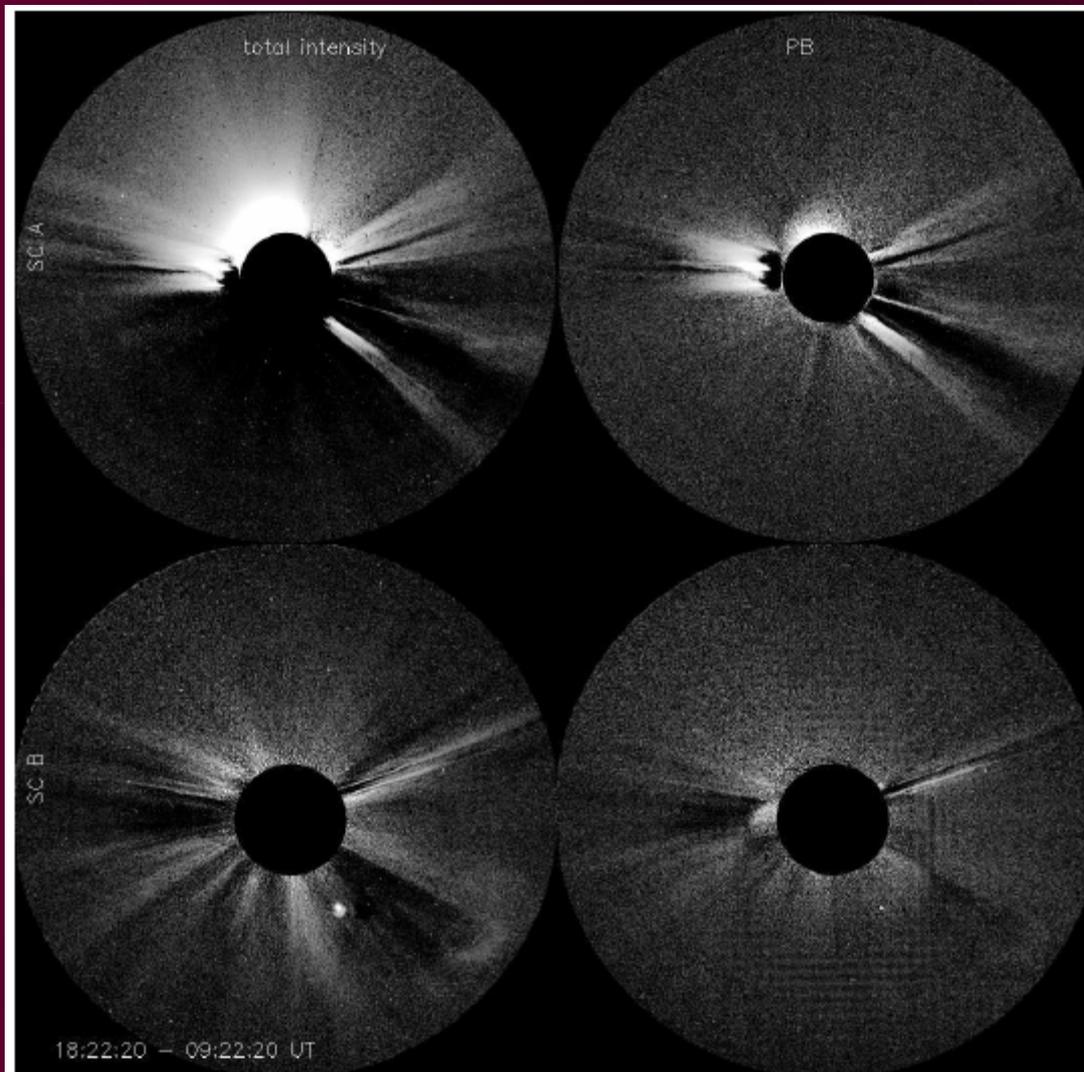
COR2/B Observations

CME



Polarization Analysis of the COR2 ray

STA



Ray only STA

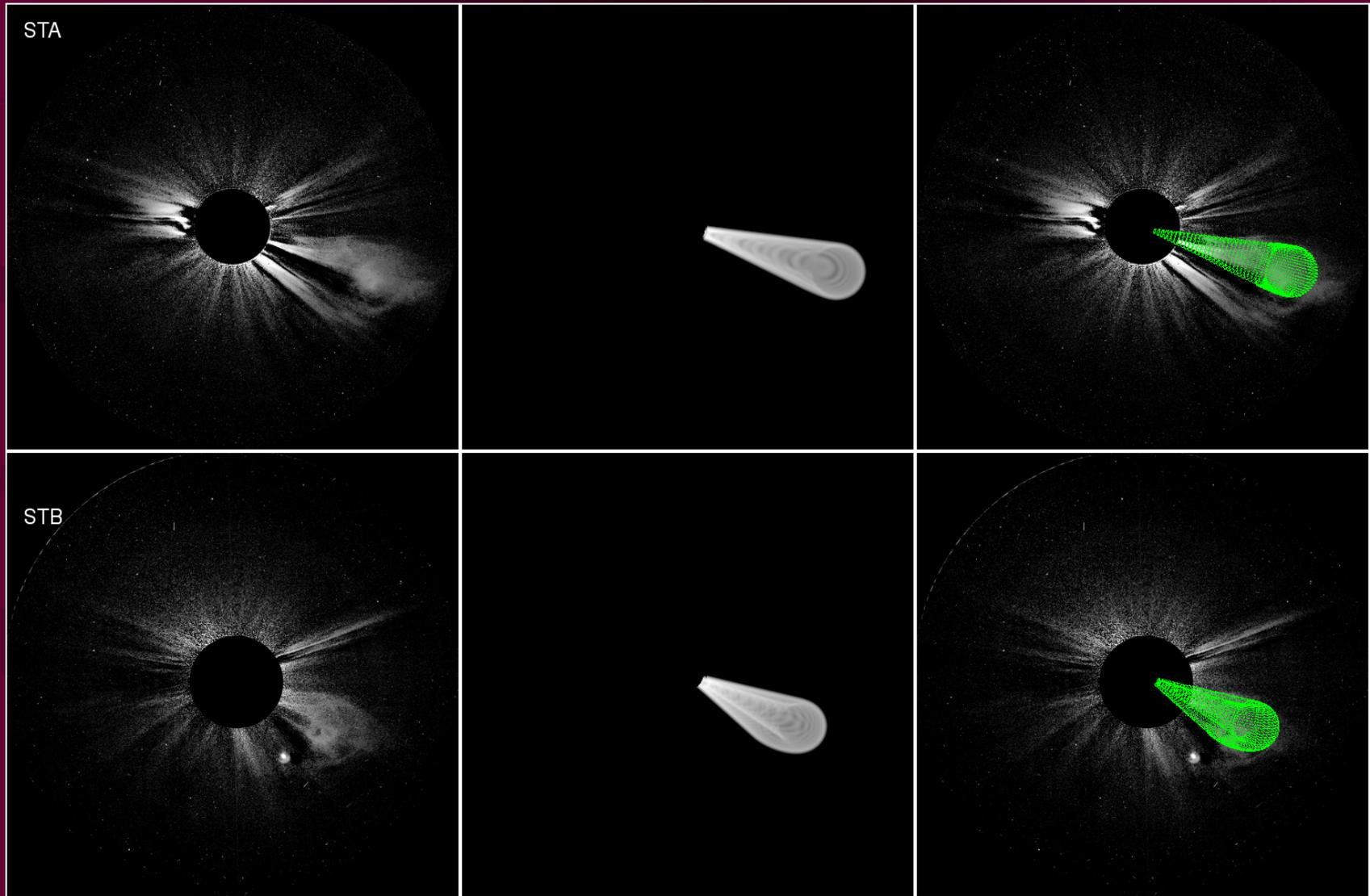
STB

3D Fitting of the CME with a flux rope

WL Images

Synthetic WL Image

Wireframe

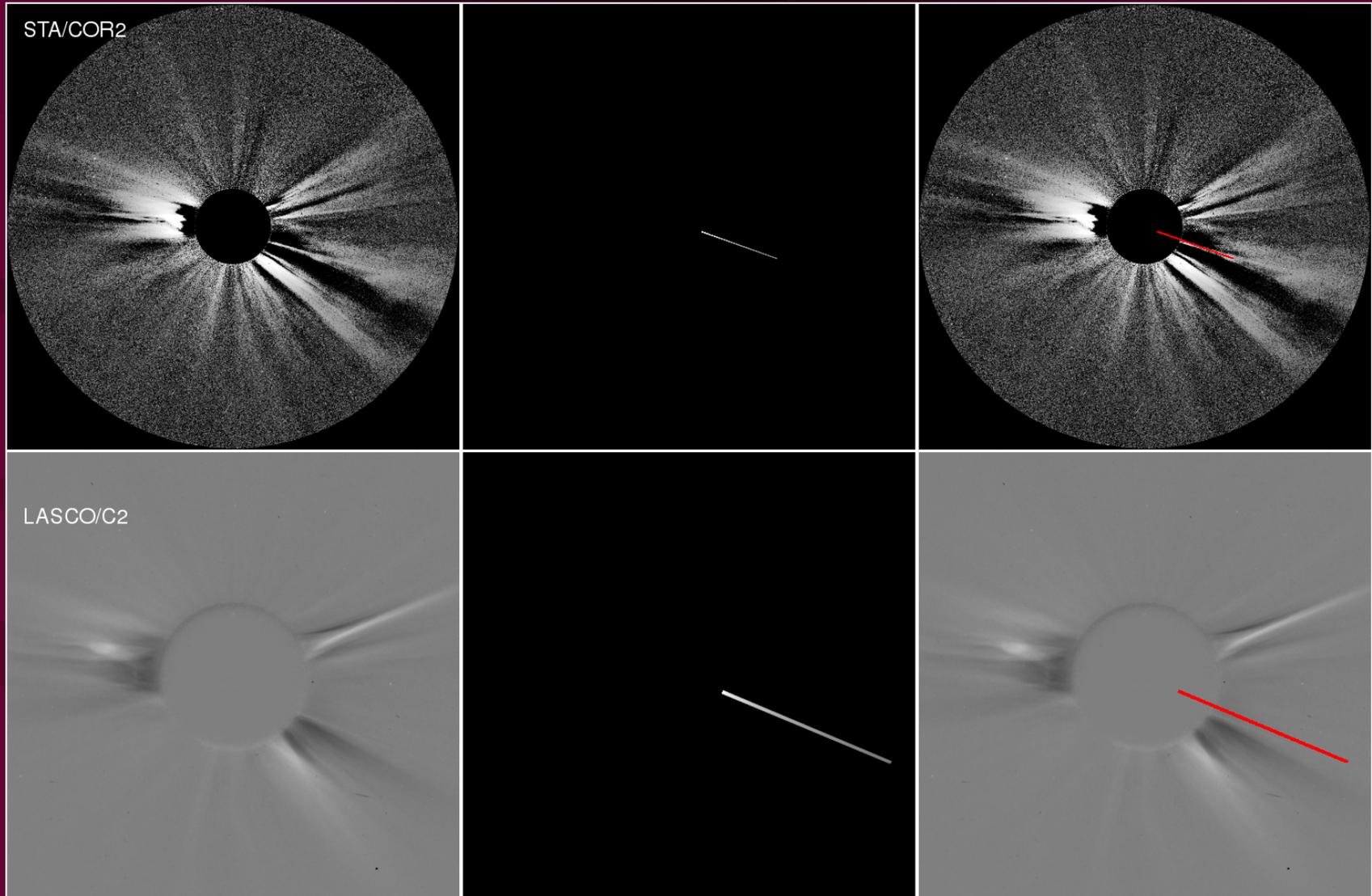


3D Fitting of the Ray with a Slab

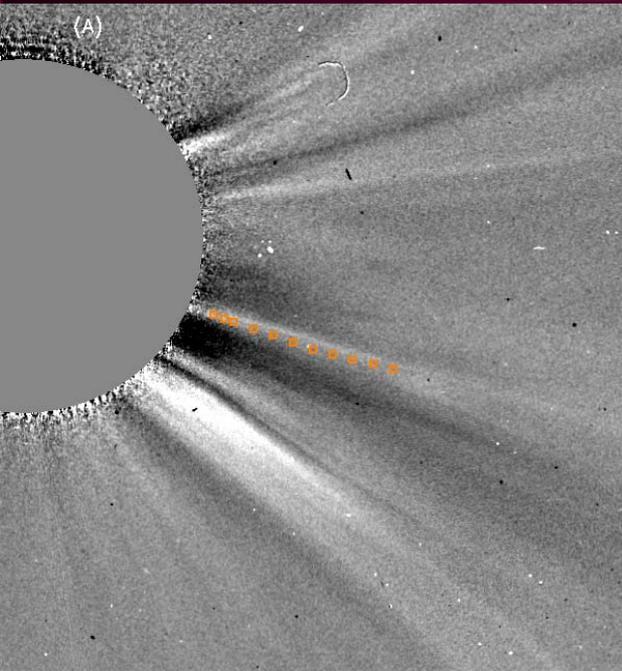
WL Images

Synthetic WL Image

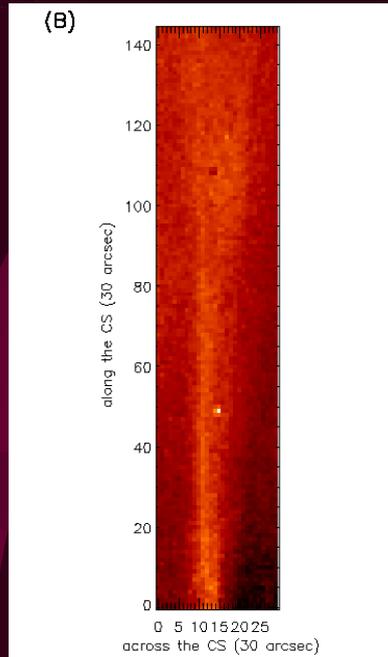
Wireframe



Determine the ray density I

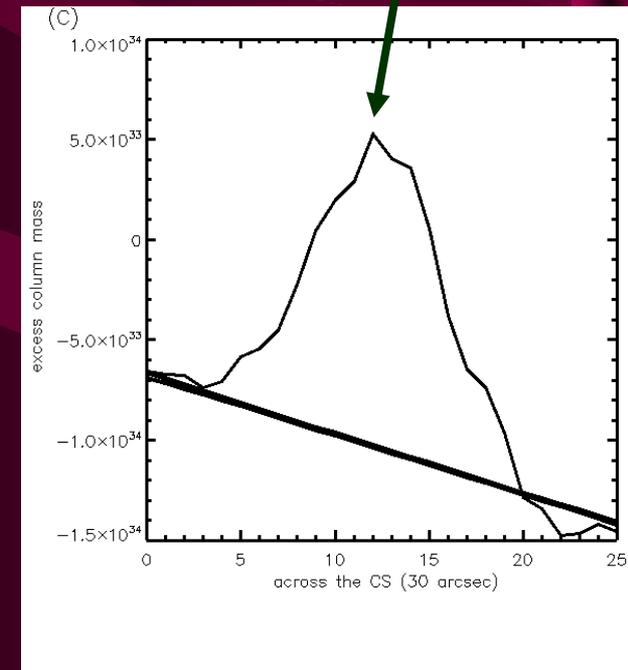


Trace the ray in
a mass image



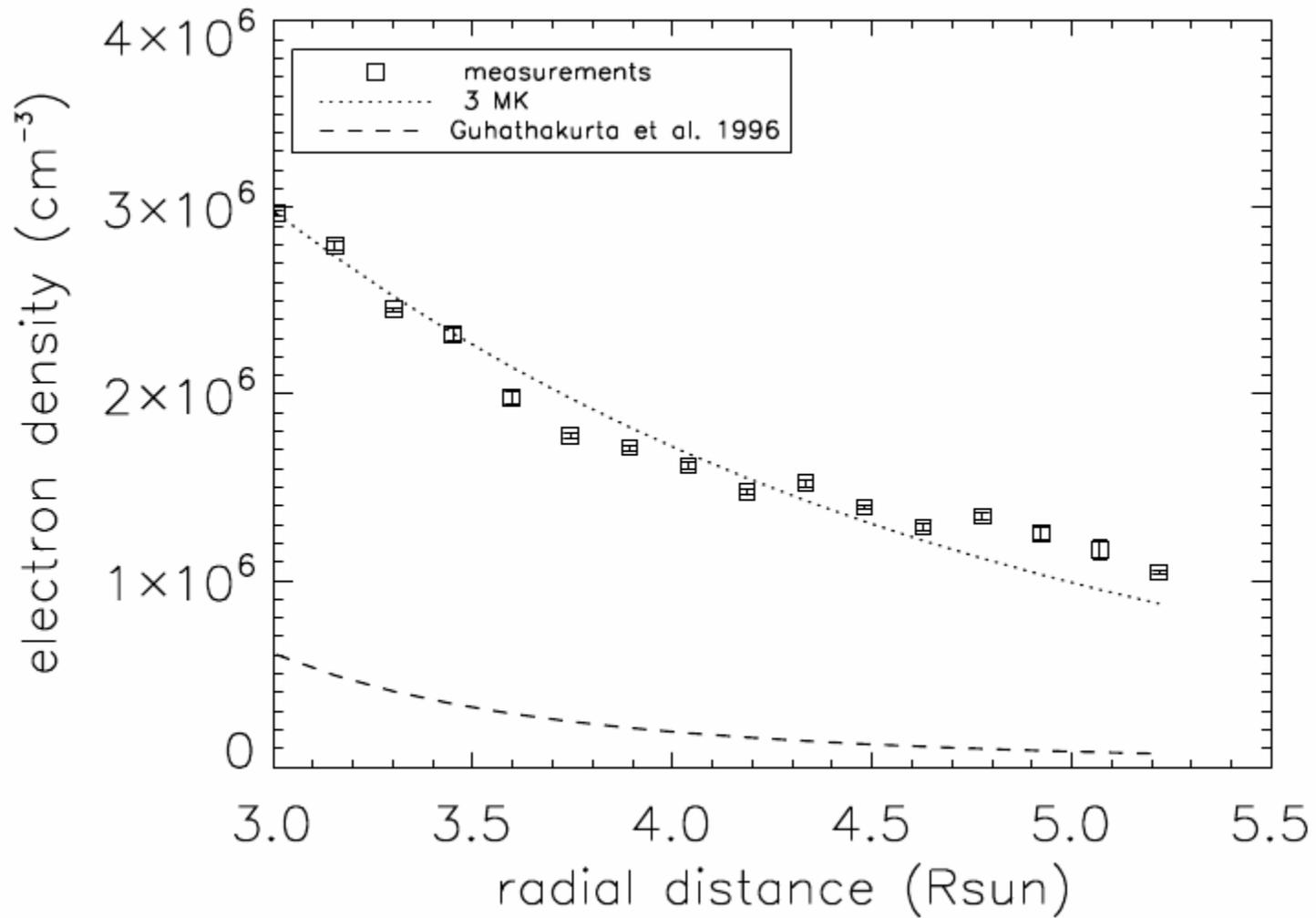
Map masses along
+ across the ray

*Use peak mass +
ray geometry from
3D modeling to
infer density*



take horizontal cuts

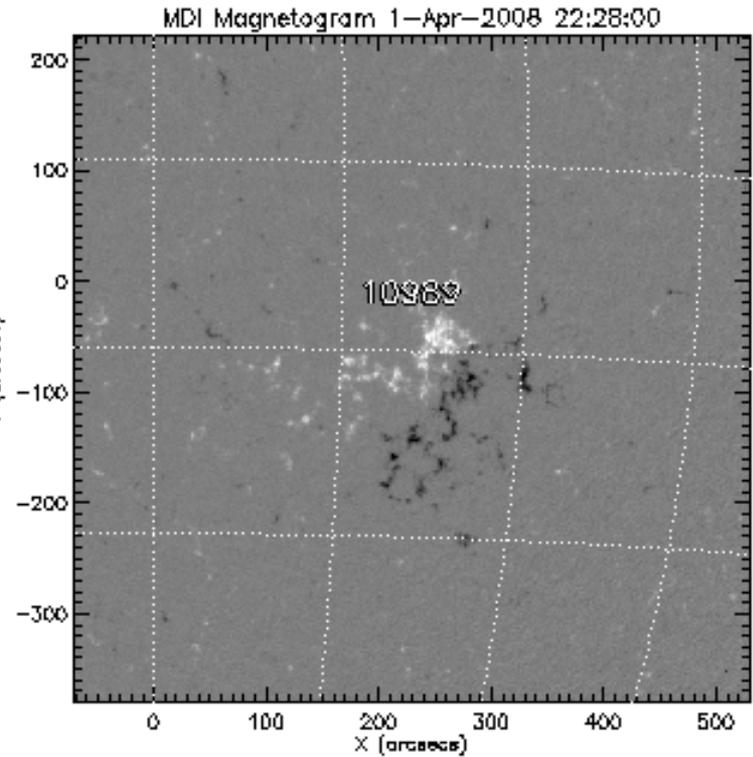
Determine the ray density II



Ray denser (10x) and hotter (3x) than the ambient corona

Results of 3D modeling of CME & ray

	C
Carrington longitude($^{\circ}$)	194
Carrington latitude($^{\circ}$)	-1'
tilt($^{\circ}$)	3.9
aspect ratio	0.16
angular width($^{\circ}$)	17.
depth (R_{\odot})	1
thickness (R_{\odot})	1

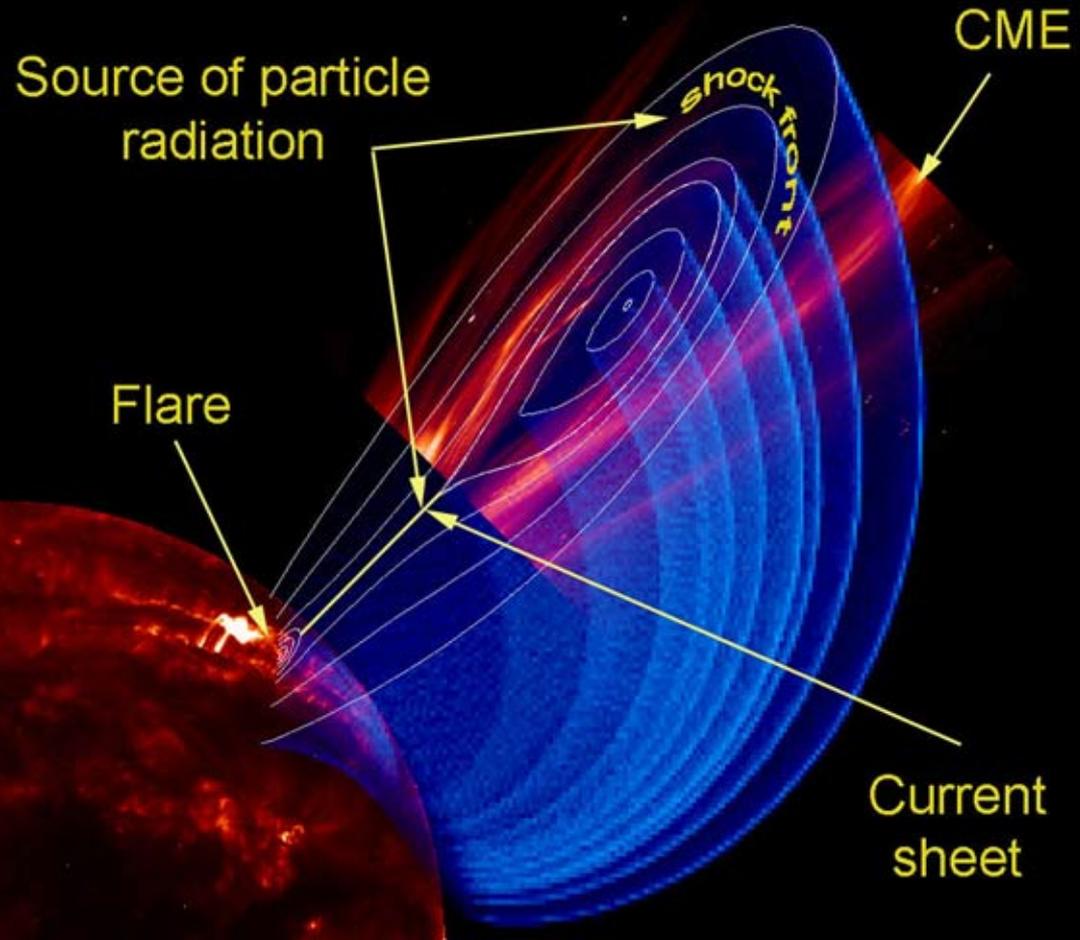
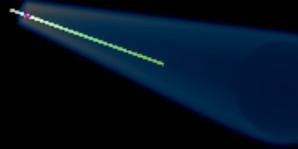


Ray almost co-aligned with the CME and much smaller
 Ray depth ~ length of the NL of the erupting AR

Putting everything together

ecliptic

10 degrees above the ecliptic



Green → ray

Blue → CME

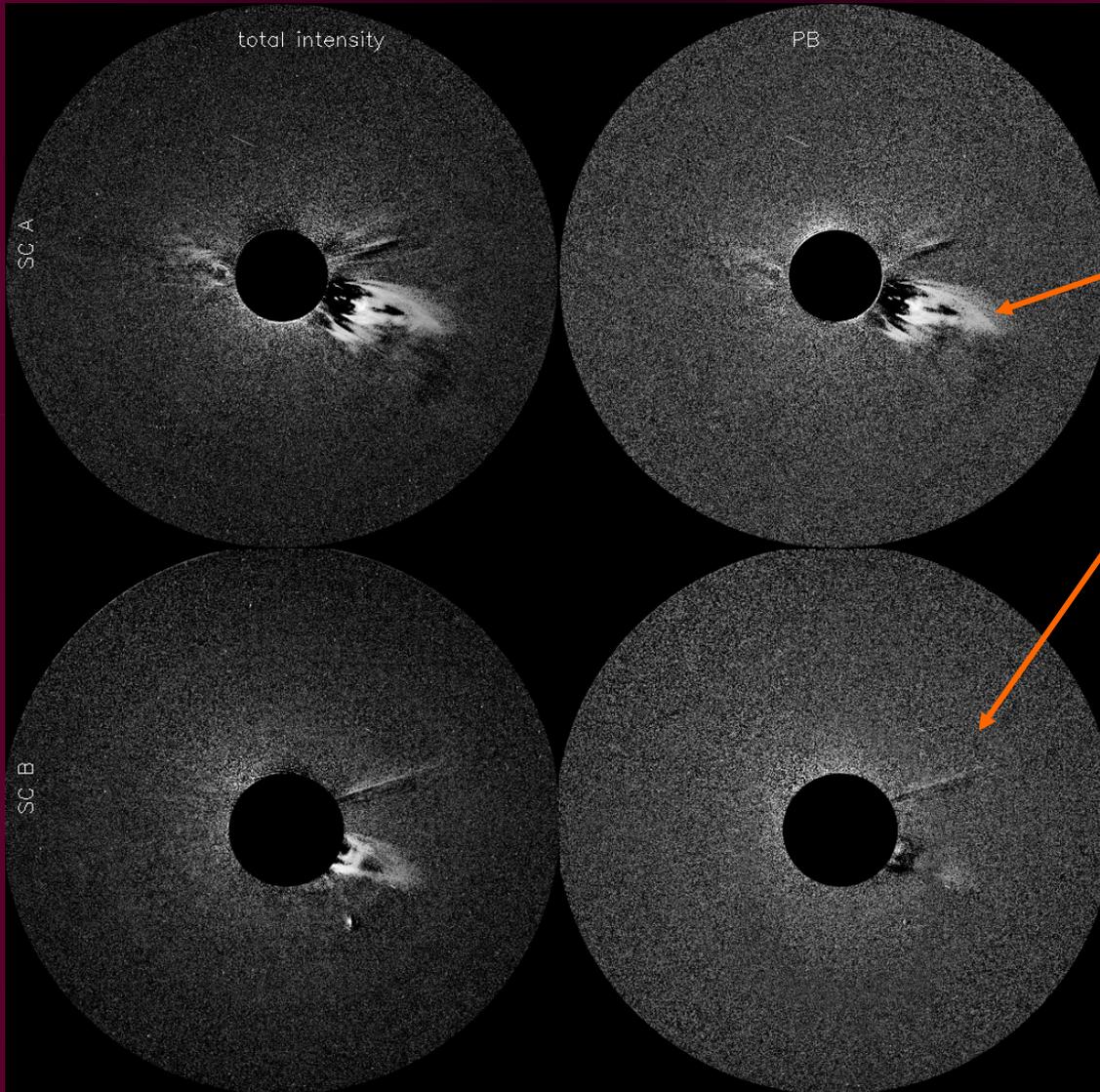
Standard CME model

Conclusions

- We derived the 3D, shape, size & location of the 9-April-2008 CME and post-CME ray
- The ray could be fitted with a slab
- The ray width ($0.15 R$) is similar to the size of the post-flare loop system seen on the disk
- The ray occupies a much smaller volume than the CME
- The ray is almost lined up with the CME axis
- The ray is hotter and denser than the ambient corona
- **All the above give strong evidence that the post-CME ray could be a post-CME current sheet**

Polarization Analysis of the COR2 CME

STA



STA event