

STEREO Observations of a post-CME Current Sheet

Spiros Patsourakos, NRL/GMU

Angelos Vourlidas, NRL

Guillermo Stenborg, NRL/Interferometrics

Introduction

- Most CME **models predict** the creation of current sheets in their wake
- Observations of **ray-like features** in the corona after CMEs are quite frequent and interpreted as a signature of the post-CME current sheet

Questions to address with SECCHI observations

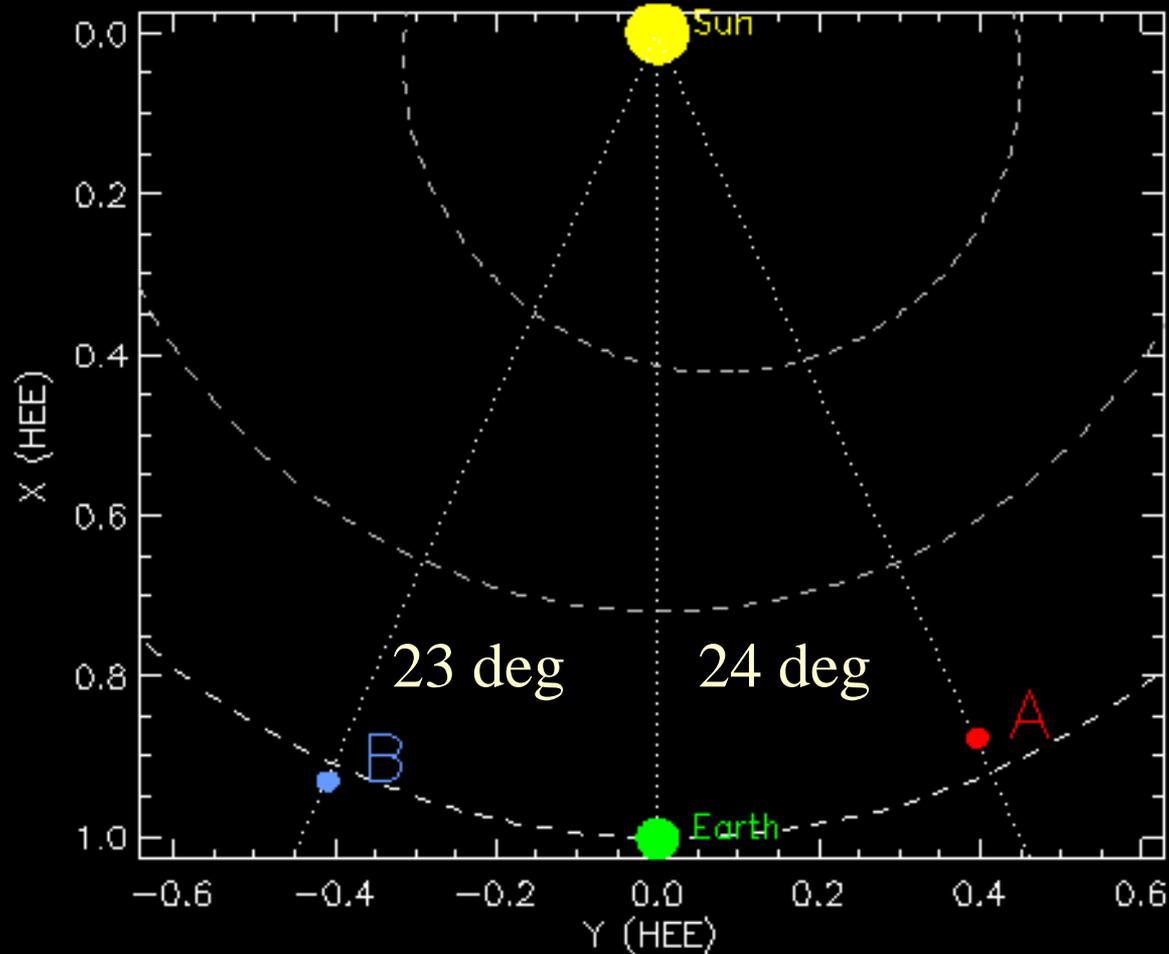
- 3D properties of ray-like features?
- How do they compare with 3D properties of CME ?
- How do they link to the source region ?

First Event:

STEREO 3D analysis of the ‘cartwheel’ CME and current sheet

Configuration of Our Observations

Positions of STEREO A and B for 2008-04-09 00:00 UT



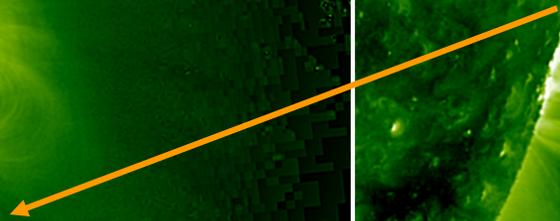
091530

093530

104530

EUVIA Observations

eruption



110530

114530

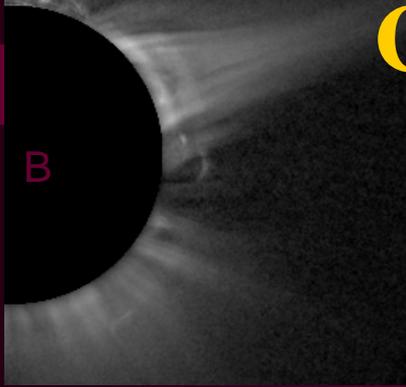
122530

Post-flare Loops



COR1 Observations: 1.3-4 R

10:15 UT

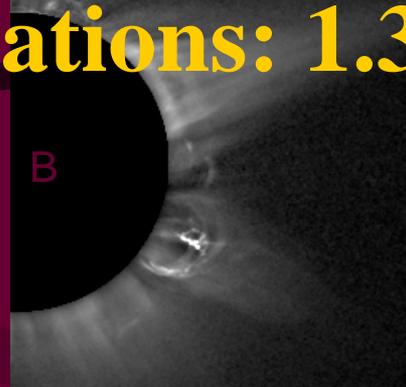


B

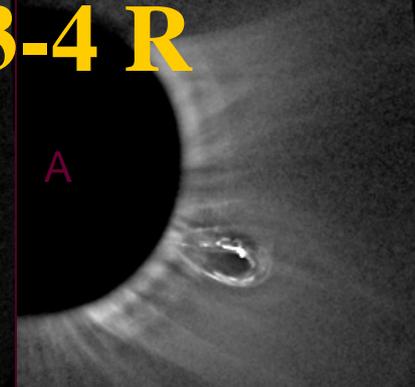


A

10:55 UT

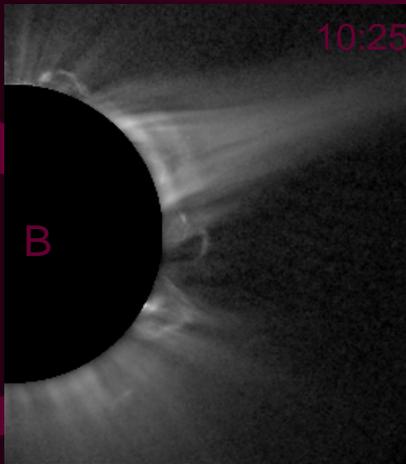


B

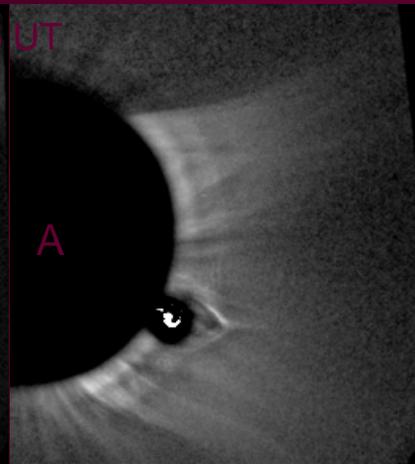


A

10:25 UT

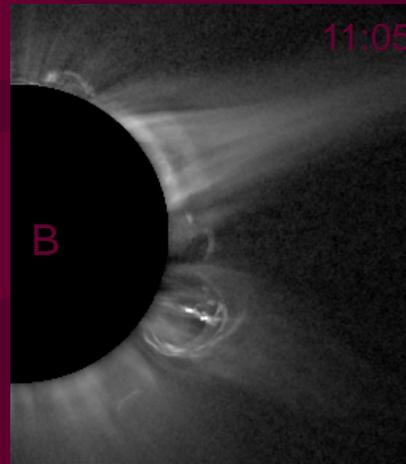


B

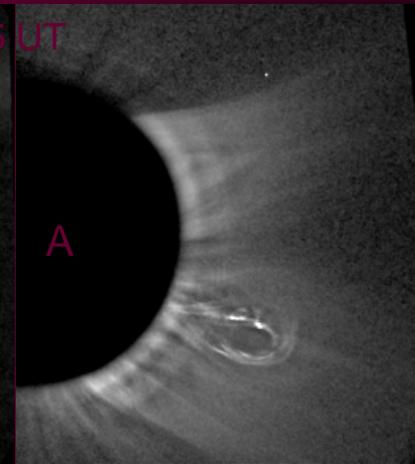


A

11:05 UT

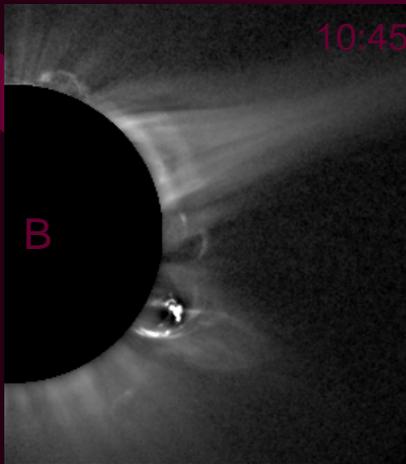


B

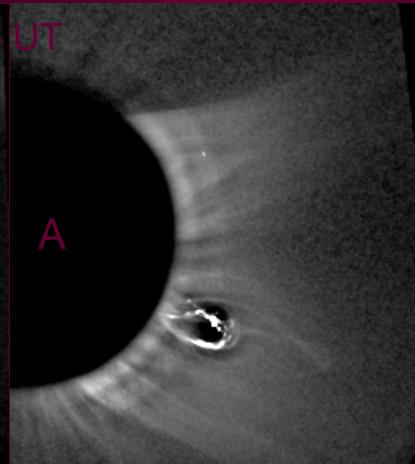


A

10:45 UT

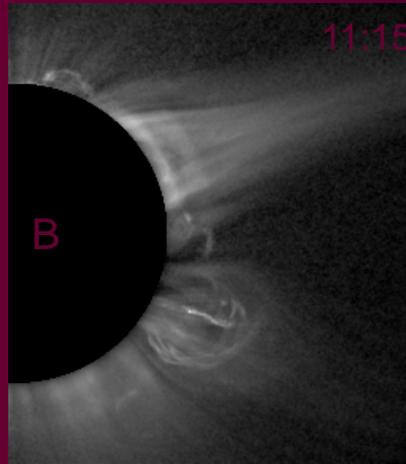


B

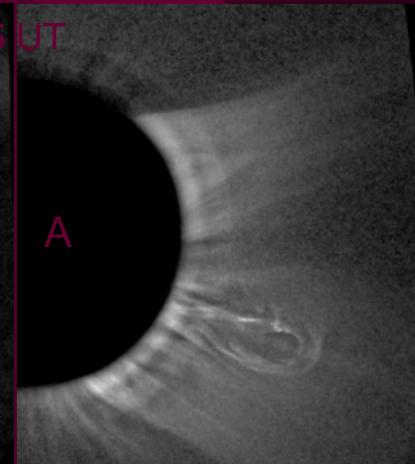


A

11:15 UT



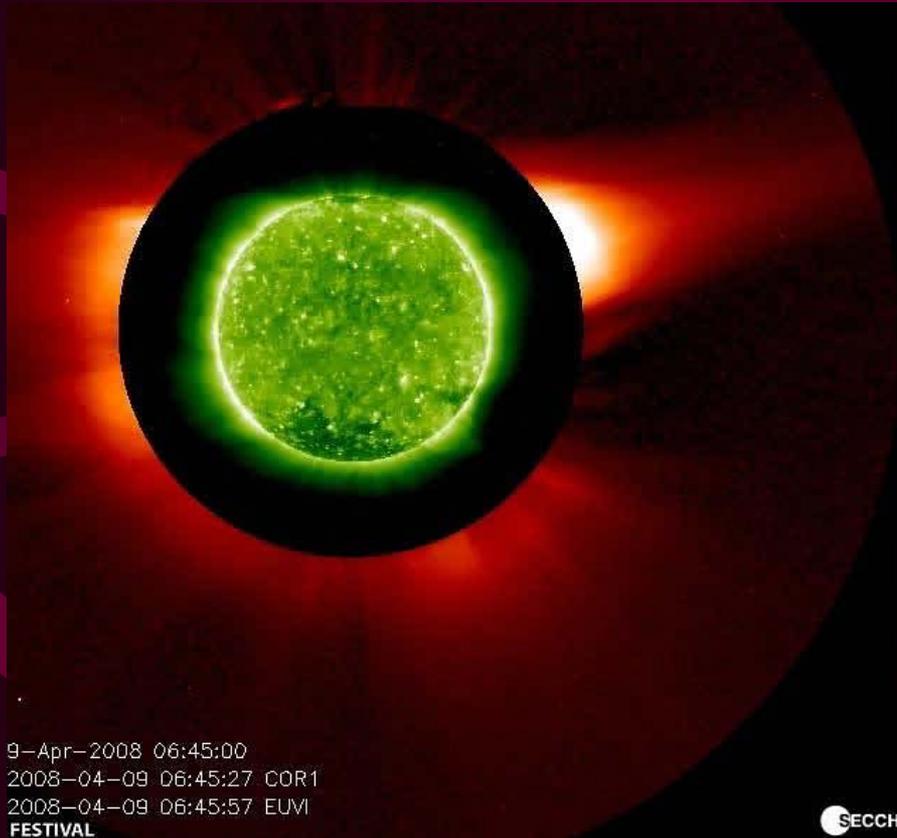
B



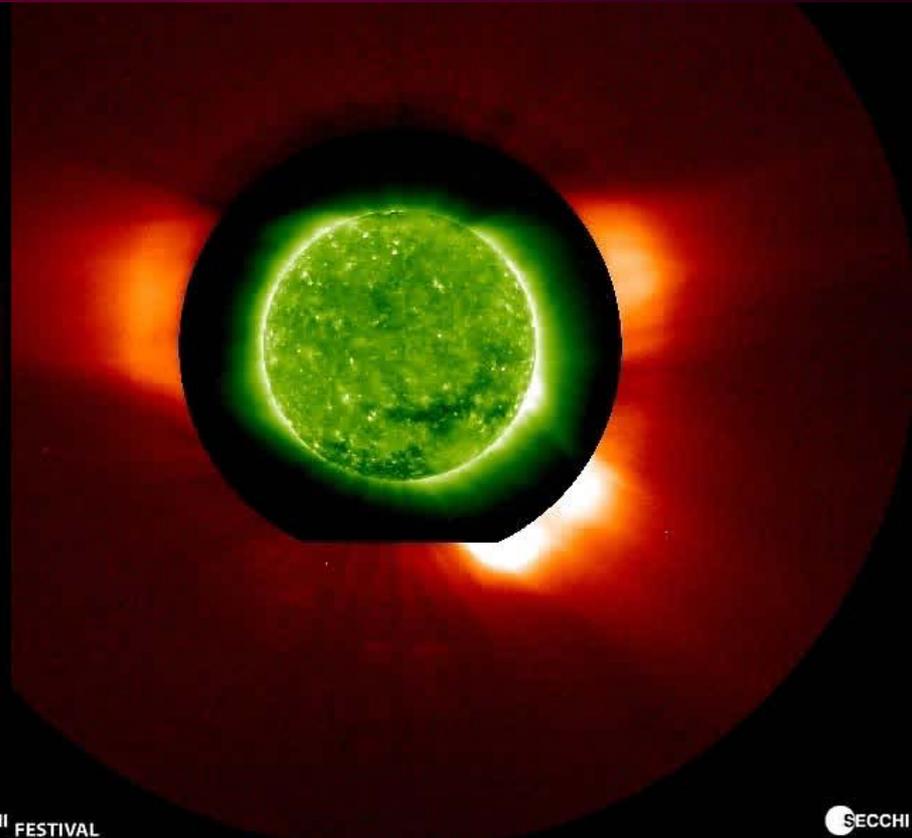
A

CME in Low Corona

SECCHI-B



SECCHI-A

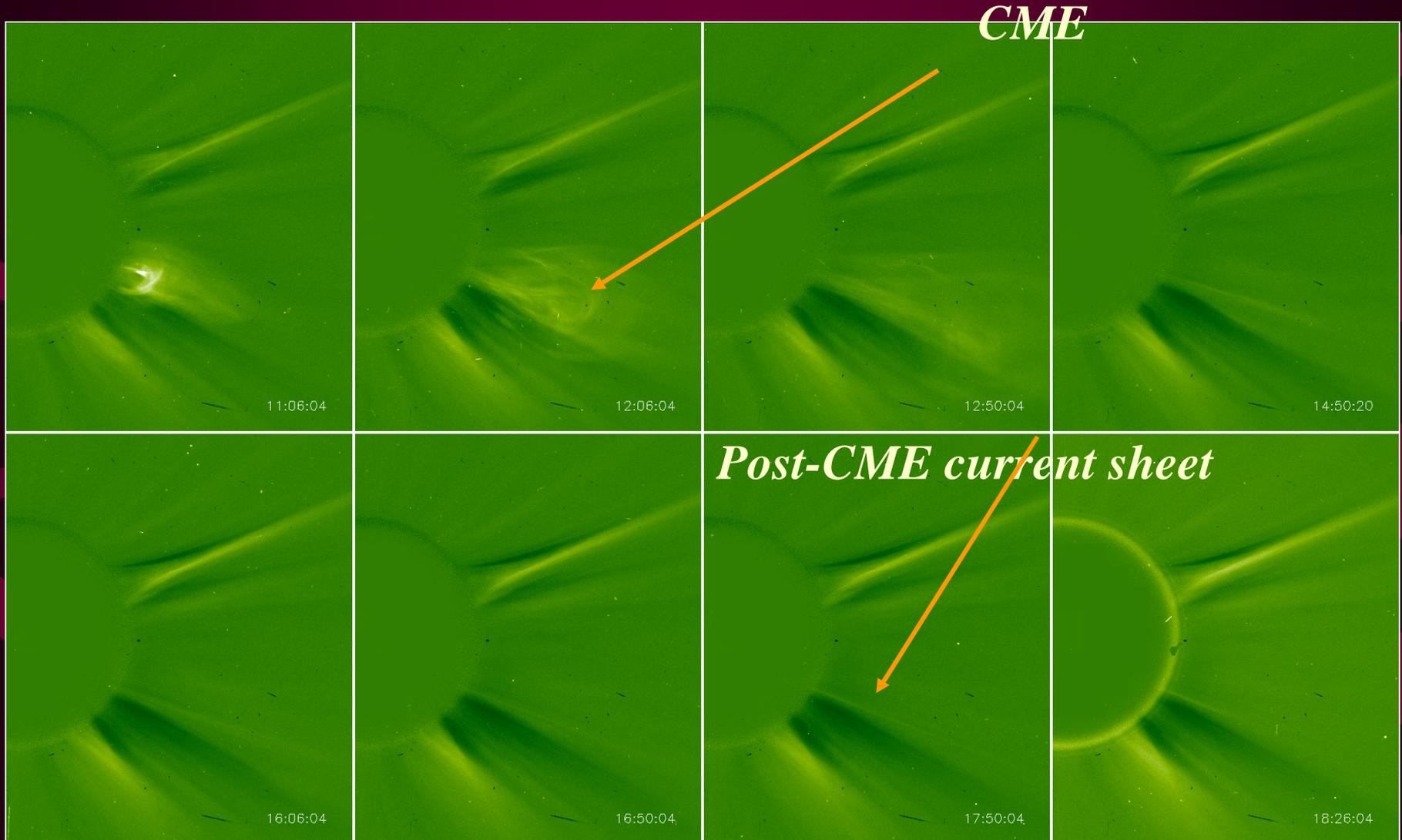


9-Apr-2008 06:45:00
2008-04-09 06:45:27 COR1
2008-04-09 06:45:57 EUVI
FESTIVAL

SECCHI FESTIVAL

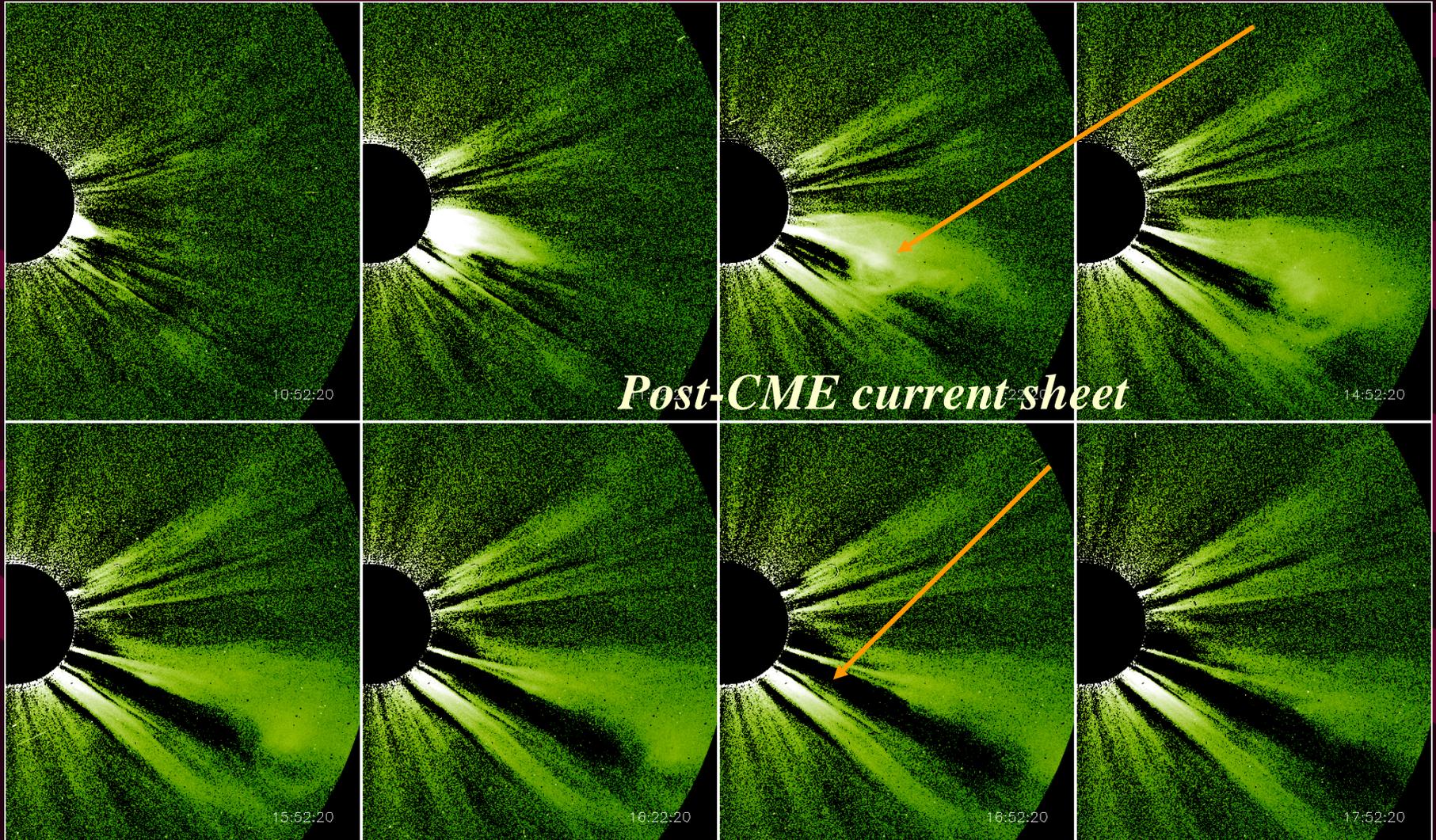
SECCHI

LASCO C2 Observations: 2.5-6 R



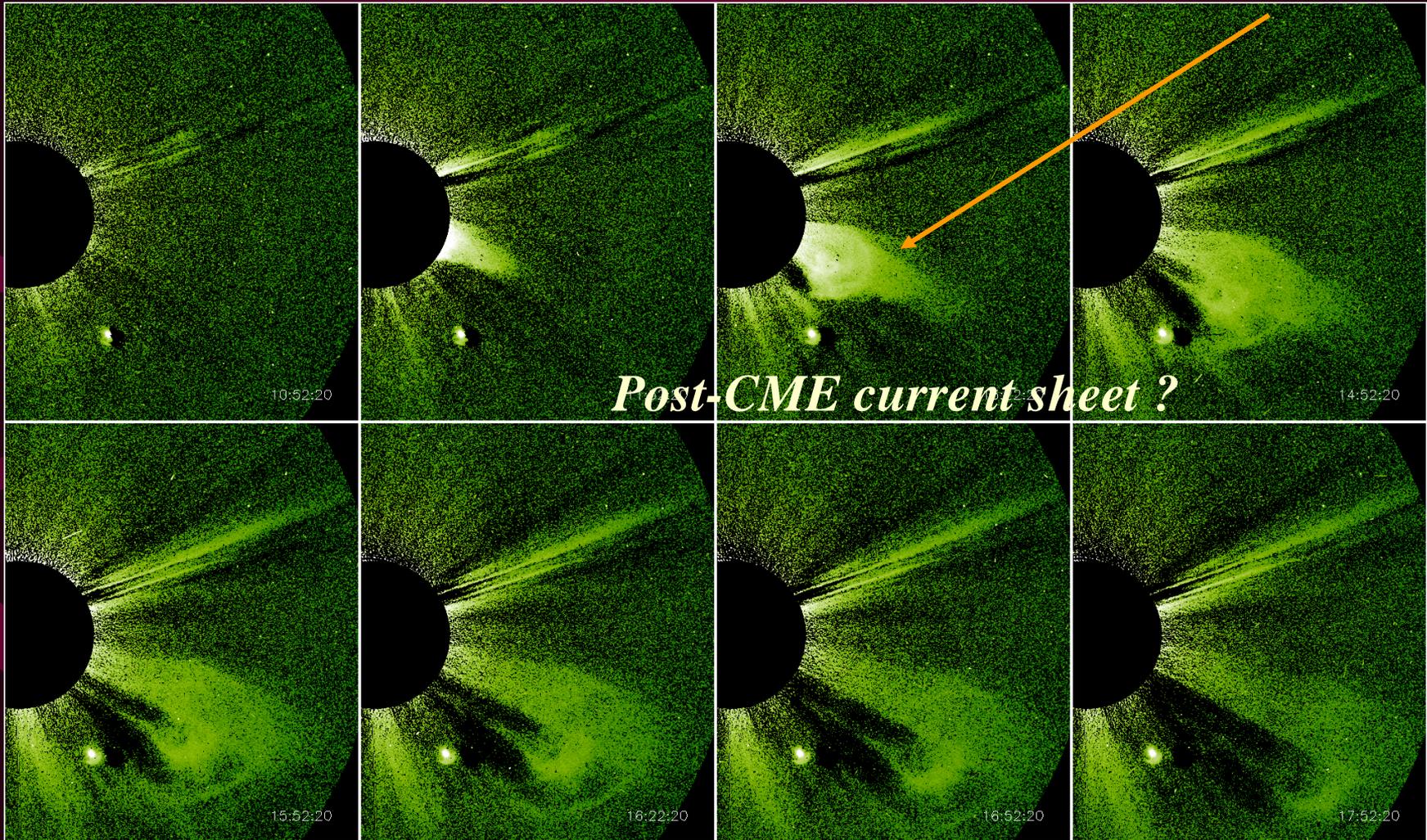
COR2/A Observations: 2.3-15 R

CME

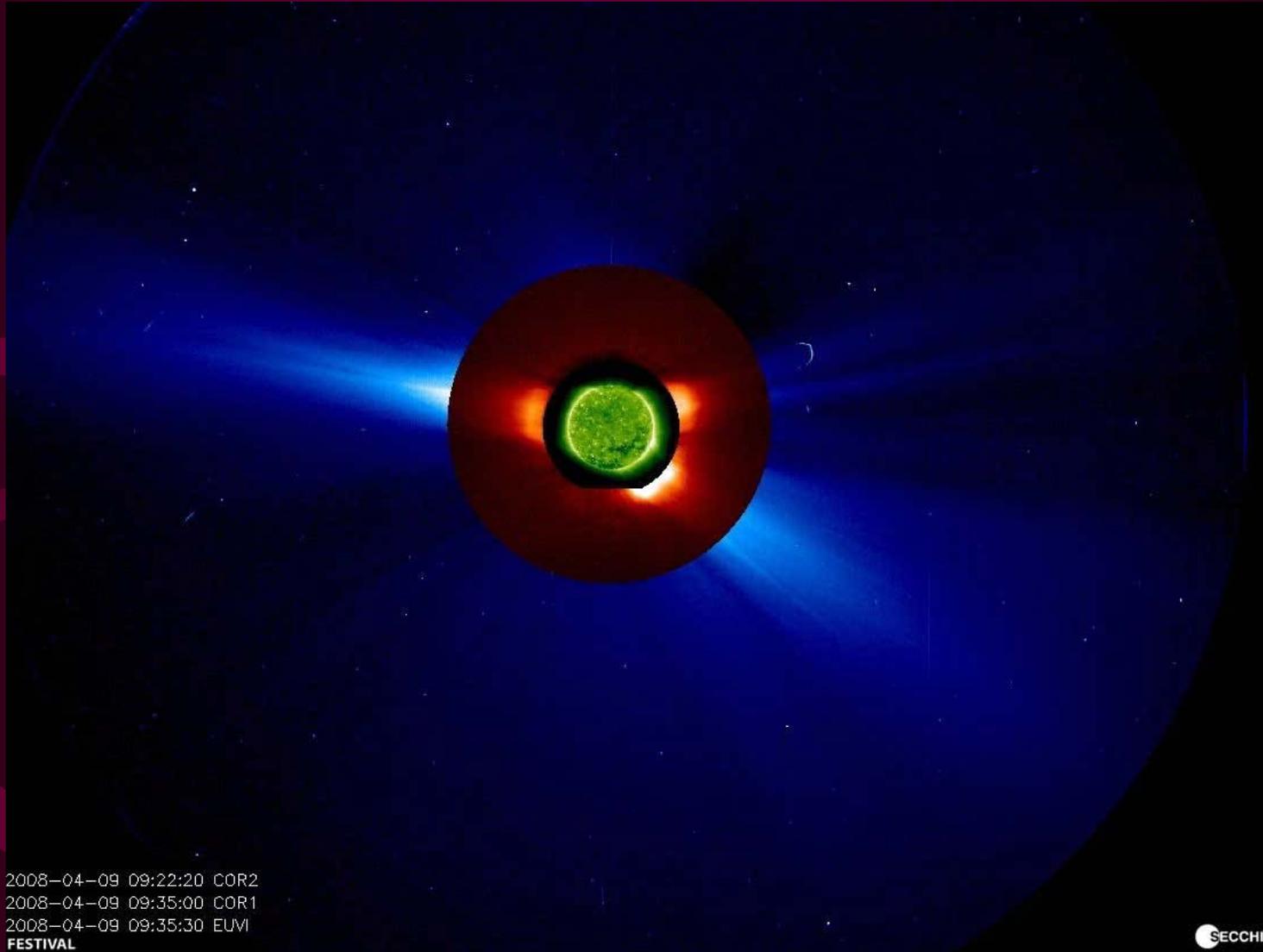


COR2/B Observations: 2.3-15 R

CME



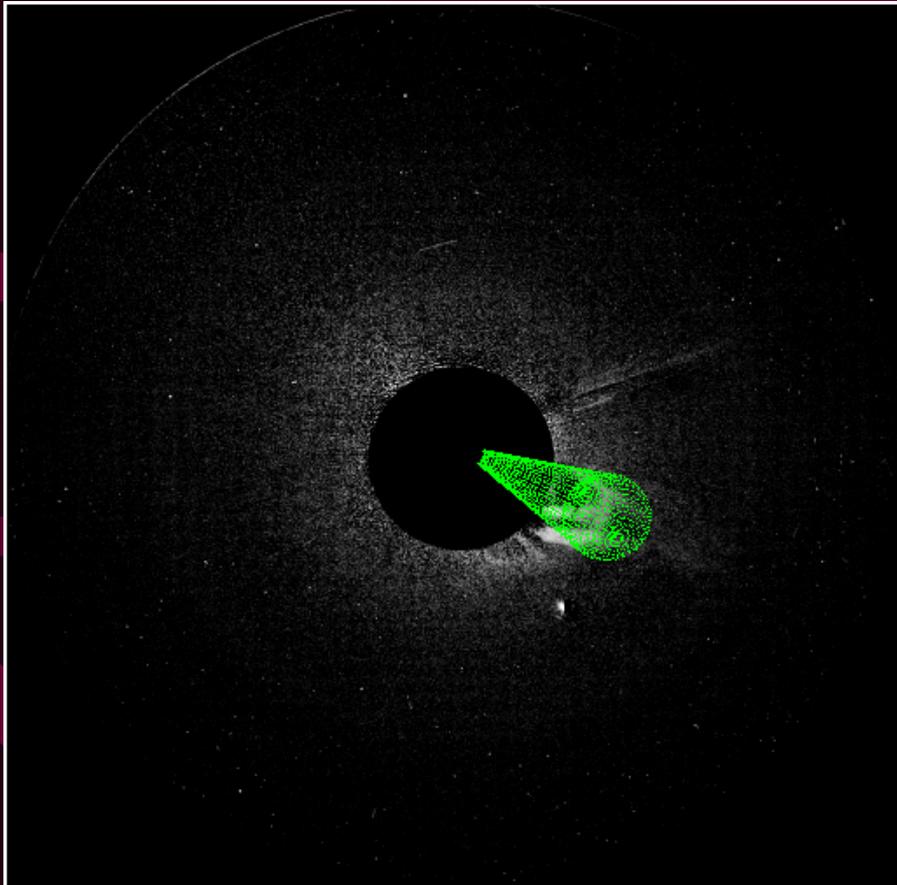
CME in SECCHI-A



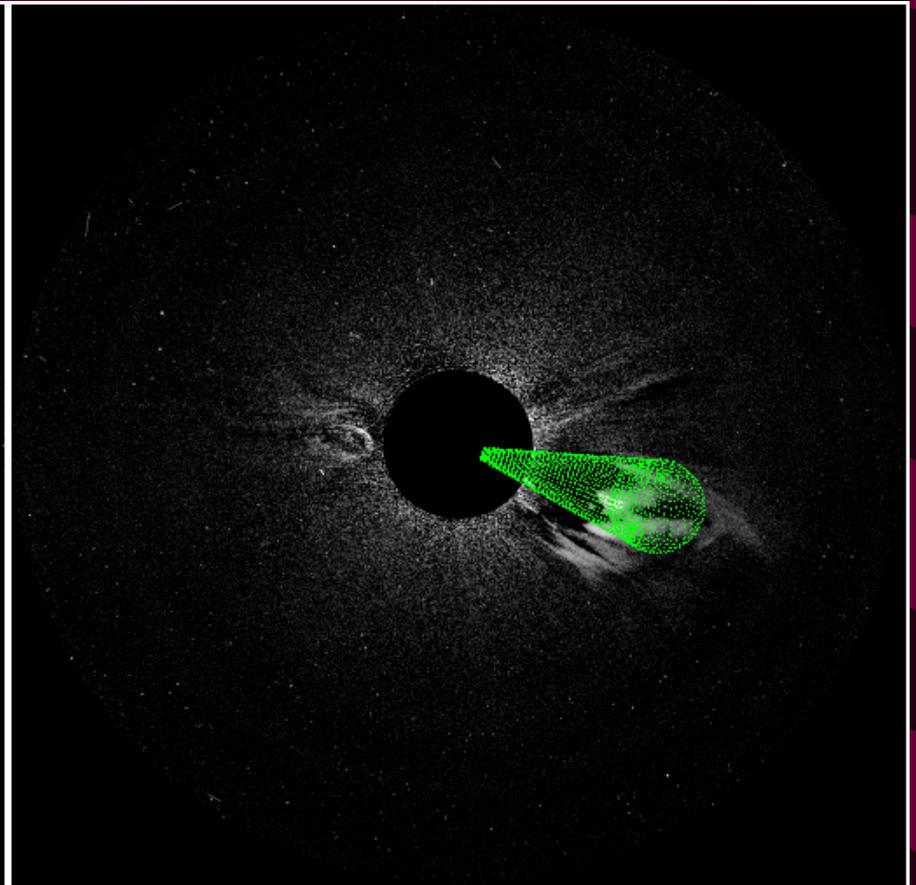
2008-04-09 09:22:20 COR2
2008-04-09 09:35:00 COR1
2008-04-09 09:35:30 EUVI
FESTIVAL

Fit COR2 CME w/ a Flux Rope Model

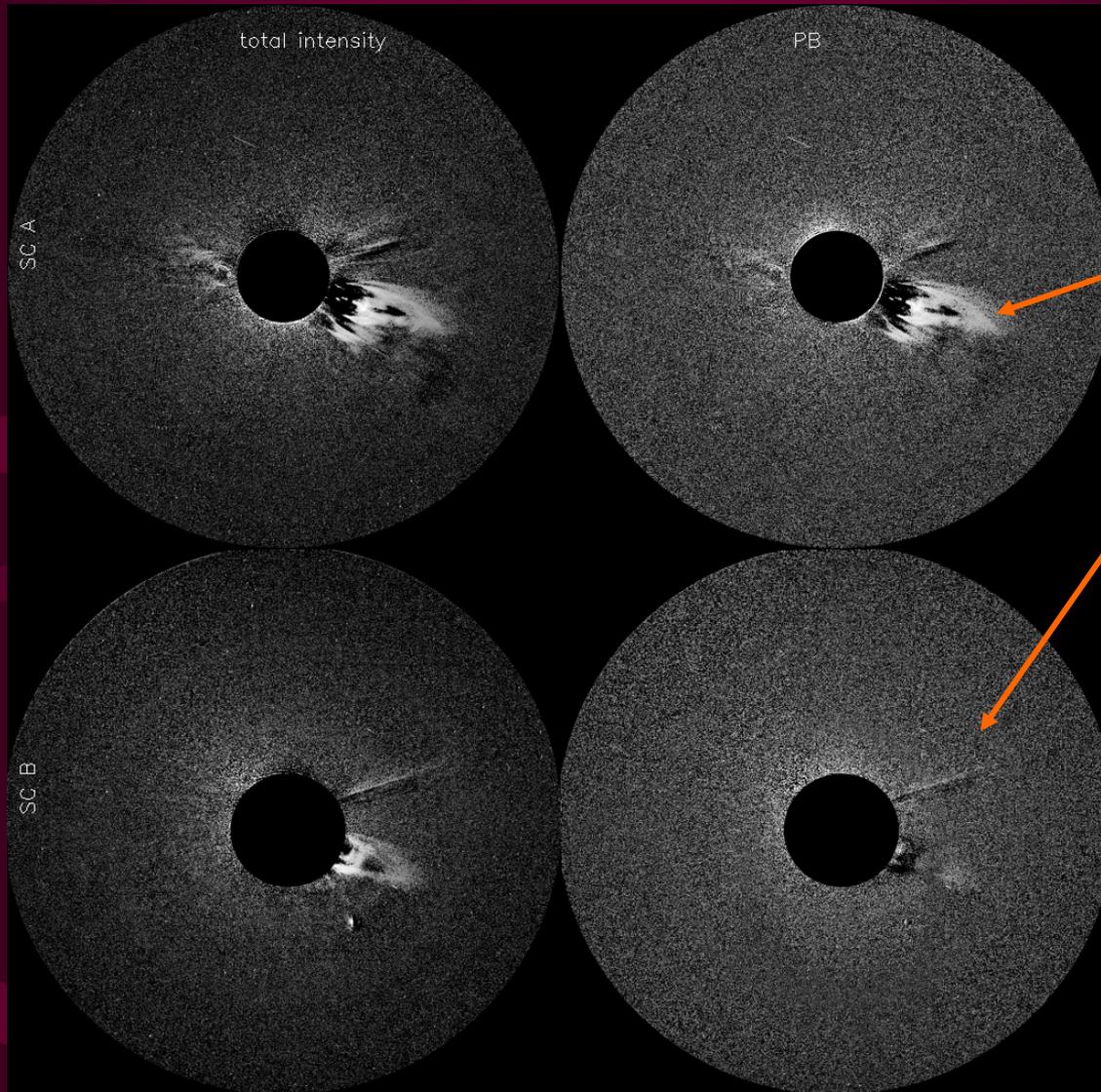
SC B



SC A



Polarization Analysis of the COR2 CME



SC A event

CME SUMMARY Heliographic Coordinates

- Tie-point reconstruction : [101, 105]
- Comparison with a 3D electron density : [104, 105]
- Polarization analysis : [100, 107]
- Constraint on the mass calculation
derived from both S/C : [110, 118]
- Analysis of the plane-of-sky speed of the
event derived from both S/C, with the
speed determined by:
 - i) CACTUS (median speed)..... : 105
 - ii) point & click on the position of LE . : [99,101]

The CME direction about 15 degrees from the plane of the sky from Earth

3D Fitting of the Current Sheet

LASCO

COR2A

Width : 0.1 R
Latitude: 111
Longitude: -20
Aspect ratio: 0.02

Post-CME current sheet

Conclusions

- Determined the 3D location of the 9-April-2008 'cartwheel' CME from STEREO data
- About 15 degrees from the plane of sky seen from the Earth
- Determined the 3D location of the post-CME current sheet
- The CS is almost lined up with the CME axis → casual relationship
- The CS width ($0.1 R$) is similar to the size of the post-flare loop system seen on the disk

Work in Progress

- Determine density, width and extension w/ height and time : hydrostatic temperatures
- Determine 3D inflows to the CS
- Compare w/ CS properties from XRT, EIS, UVCS
- Compare with magnetic field extrapolation of the source region