CME Challenge

Anna Malanushenko, HAO/NCAR
Elena Provornikova, JHU APL

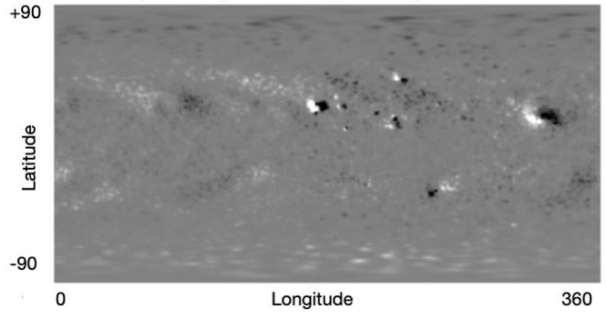
In preparation for launch…

GAMERA
Grid Agnostic MHD for Extended Research Applications

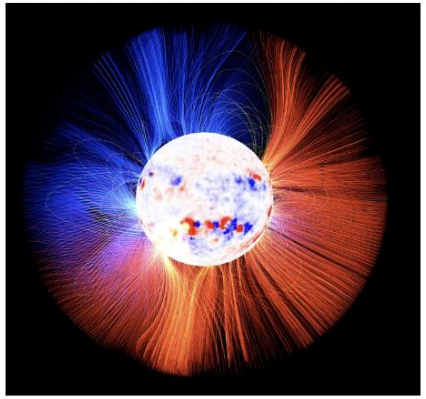
https://civspace.jhuapl.edu/gamera/

- We do not have PUNCH data at the moment!
- But we *do* have MHD simulations that we can use to mimic data for pre-launch analysis

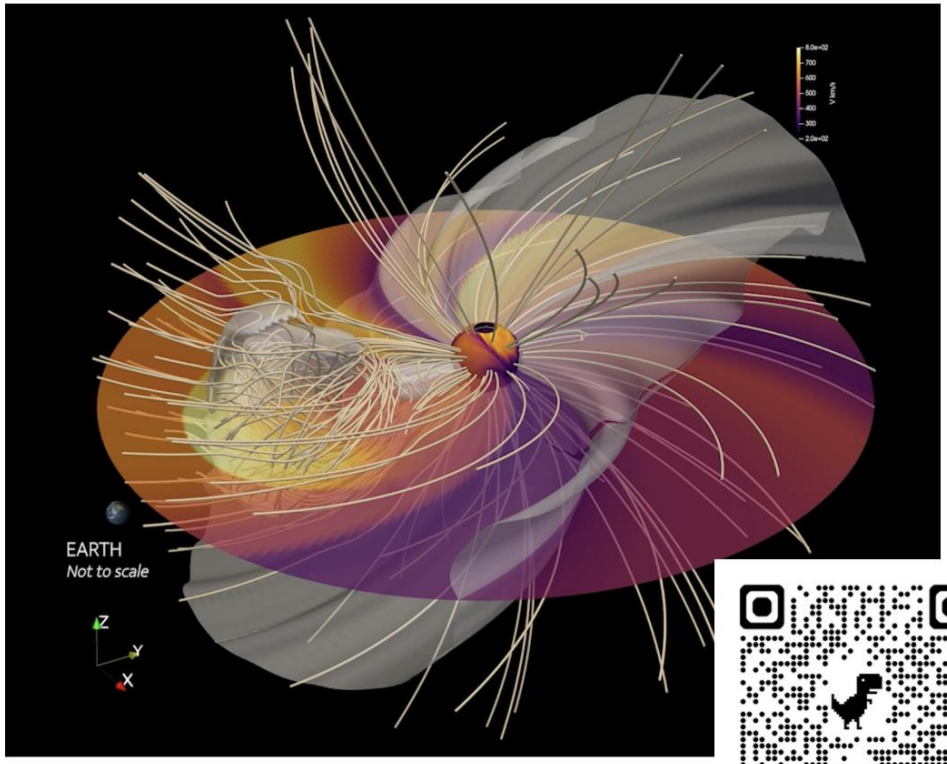
ADAPT magnetogram



WSA coronal model



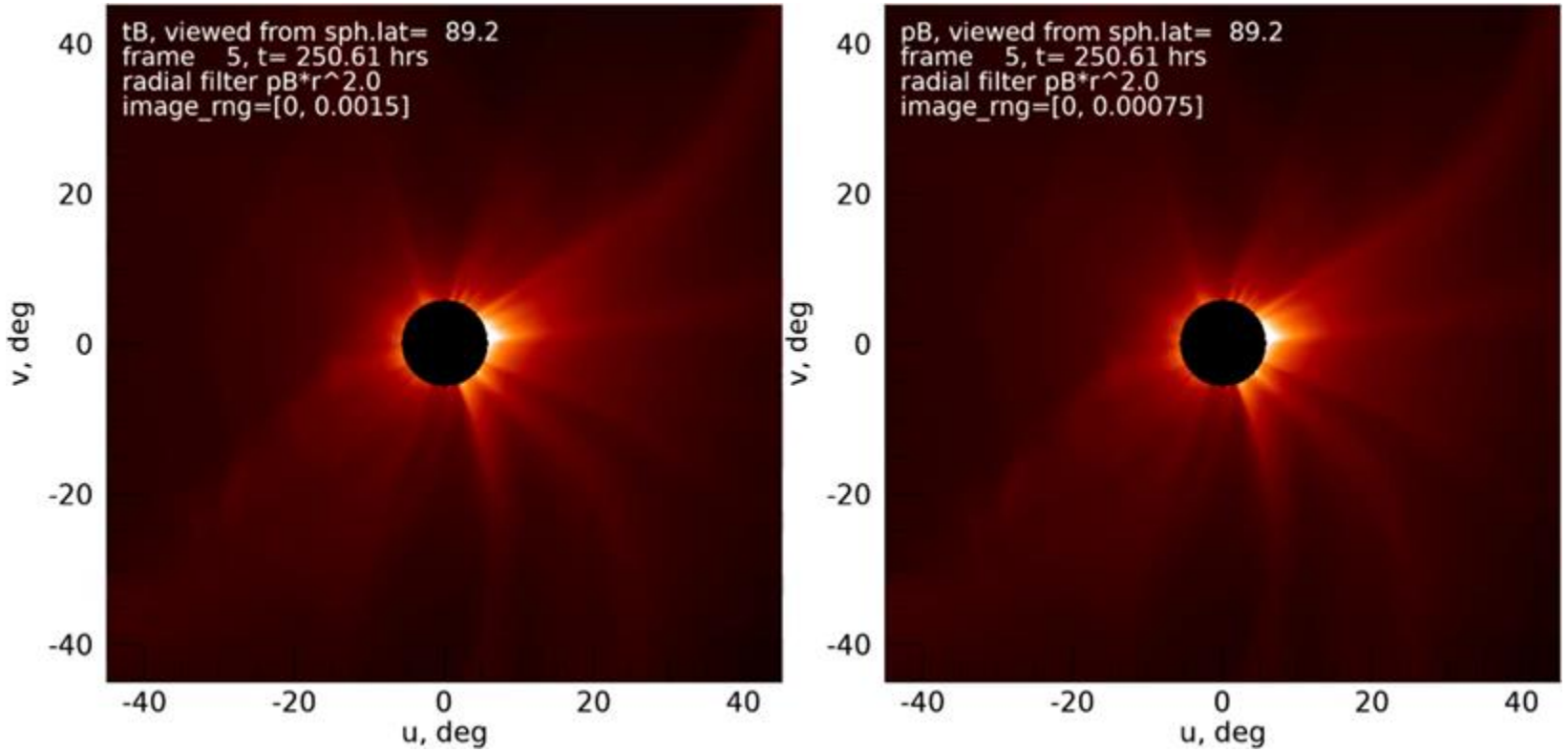
GAMERA-Helio model with a CME



Run at CCMC

Synthetic data: aka “CME Challenge v2.0”

- Synthetic PUNCH-like data using GAMERA MHD simulation
- pB, tB in PUNCH-like field-of-view and projection



Synthetic data: aka “CME Challenge v2.0”

- Synthetic PUNCH-like data using GAMERA MHD simulation
- pB, tB in PUNCH-like field-of-view and projection

- Several simulated CME events:
  - CME0: reference case: all properties of CME are known a priori
    - can be used to test CME reconstruction/flow tracking methods
  - CME1-CME3: validation cases: properties are disclosed upon request
    - can be used for *validation* of established methods

Synthetic data: aka “CME Challenge v2.0”

CME0

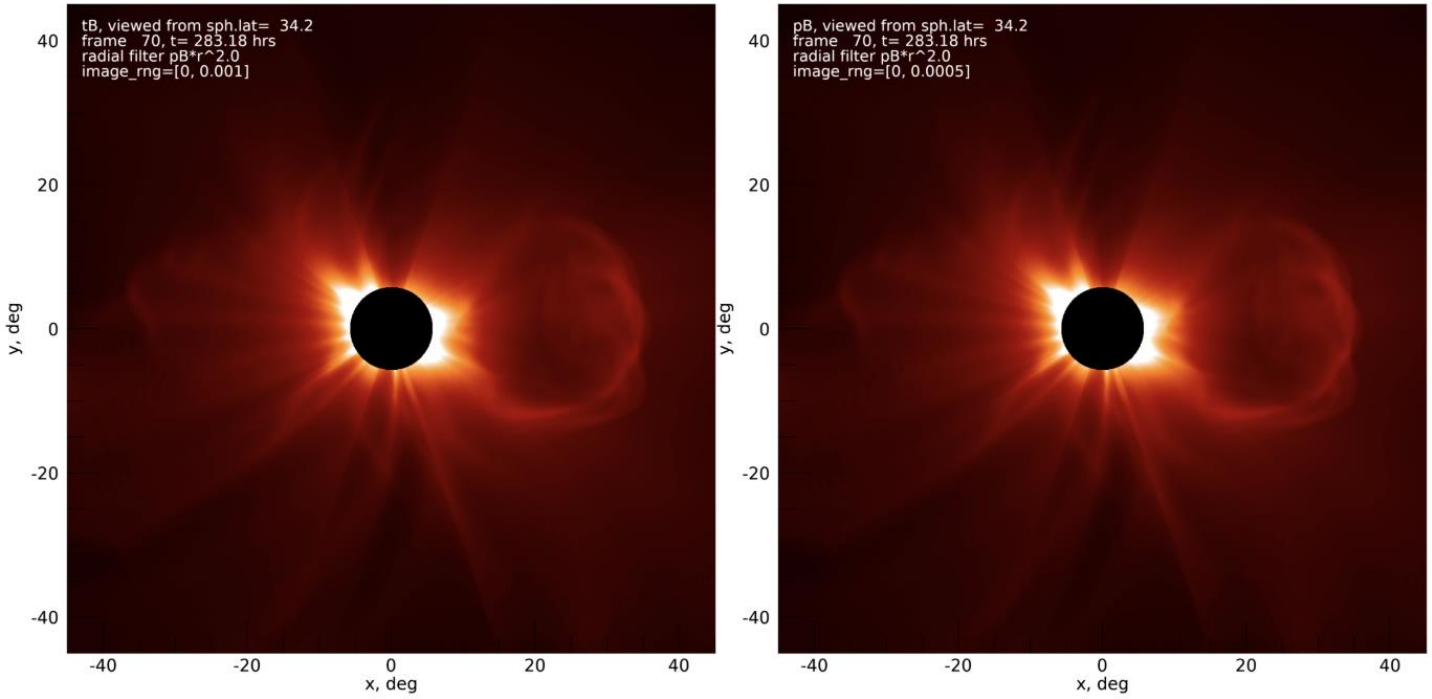
CME0

(reference case)

Starting latitude:	0°
Velocity	simulation parameter: 1700.0 km/s; as measured from 3D density data: time profile: front point, center of mass
Trajectory and mass	as measured from 3D density data: table
Angular size	simulation parameter: 45°
Shape	as measured from 3D density data: full envelope viewed N pole, face-on view, and side-on view: figure
Chirality	simulation parameter: +1;
[other properties here, determined by your analysis]	*[let me know what is useful to compute]*

Download

Observer position:	
90°E (CME on West limb)	FITS tB (~300Mb), FITS pB (~300Mb), PNG preview (~24Mb)
30°E	FITS tB, FITS pB, PNG preview
0° (halo CME)	FITS tB, FITS pB, PNG preview
60°W (CME on East limb)	FITS tB, FITS pB, PNG preview



Synthetic data: aka “CME Challenge v2.0”

CME2

CME2

(properties hidden to facilitate blind analysis; disclosed upon request)

Starting latitude:	0°
Velocity	—
Trajectory and mass	—
Angular size	—
Shape	—
Chirality	—
[other properties here, determined by your analysis]	—

Download

Observer position:	
90°E (CME on West limb)	FITS tB (~300Mb), FITS pB (~300Mb), PNG preview (~24Mb)
30°E	FITS tB, FITS pB, PNG preview
0° (halo CME)	FITS tB, FITS pB, PNG preview
60°W (CME on East limb)	FITS tB, FITS pB, PNG preview