

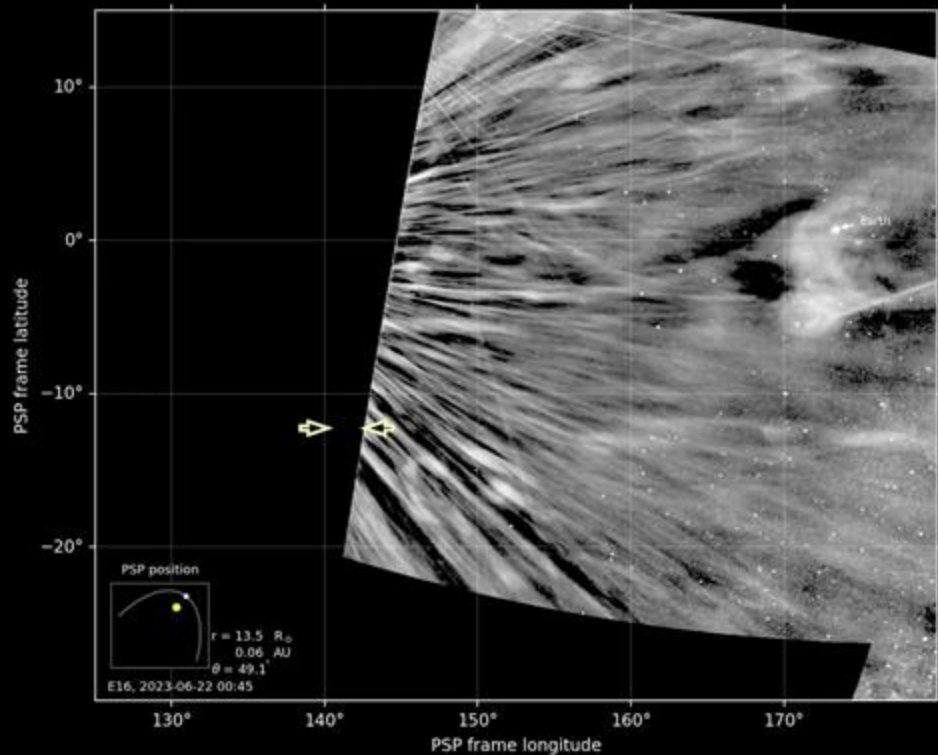
# Demonstrating wind speed measurements with WISPR via the stationary point

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Kenny Kenny

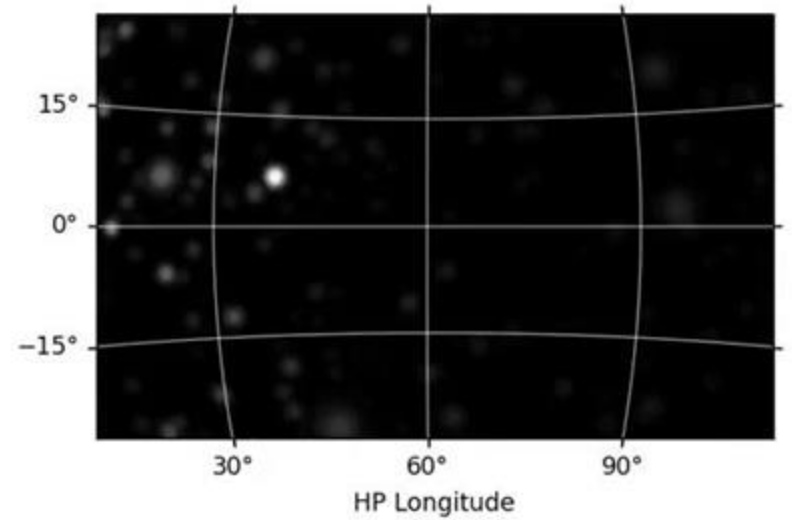
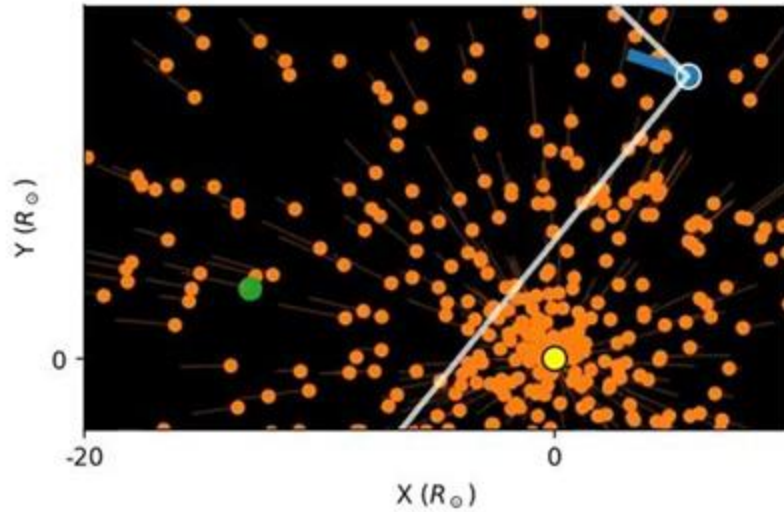
Southwest Research Institute,  
Boulder CO

PUNCH 5, June 21

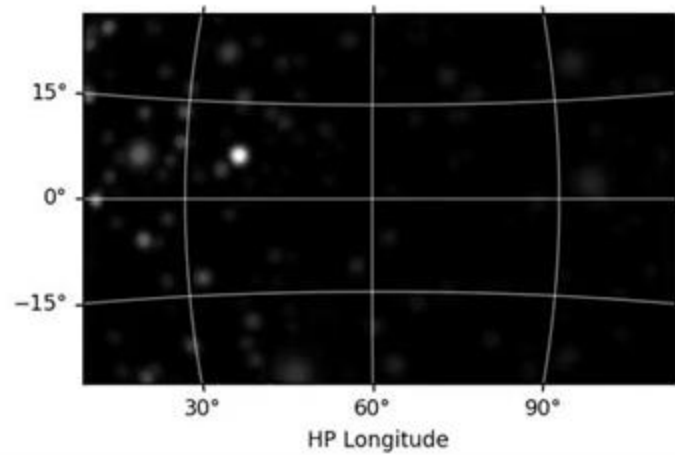
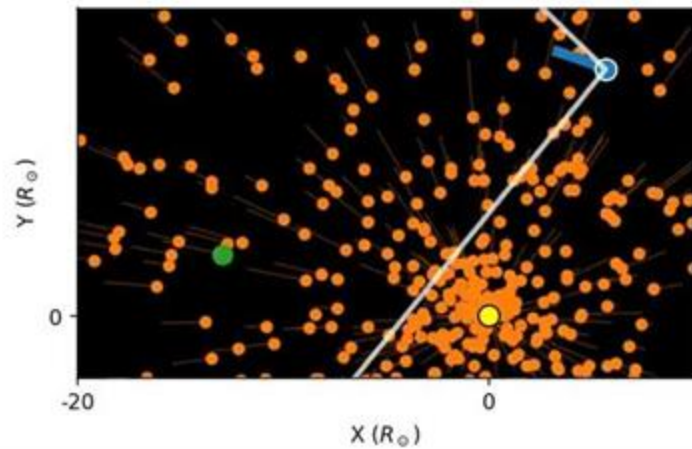


# Just a plasma parcel

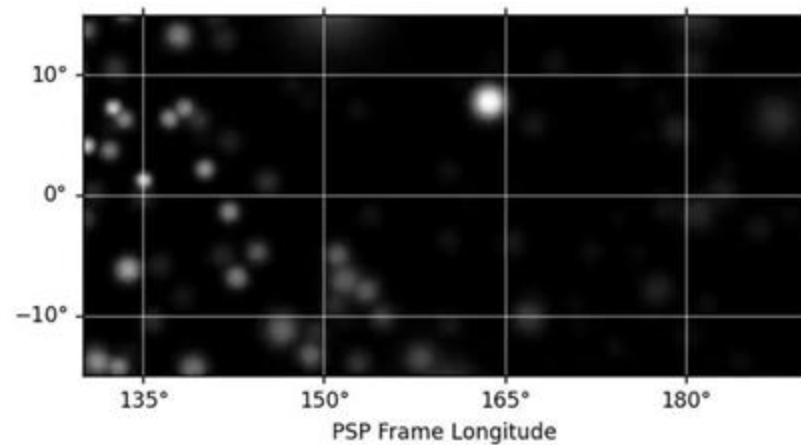
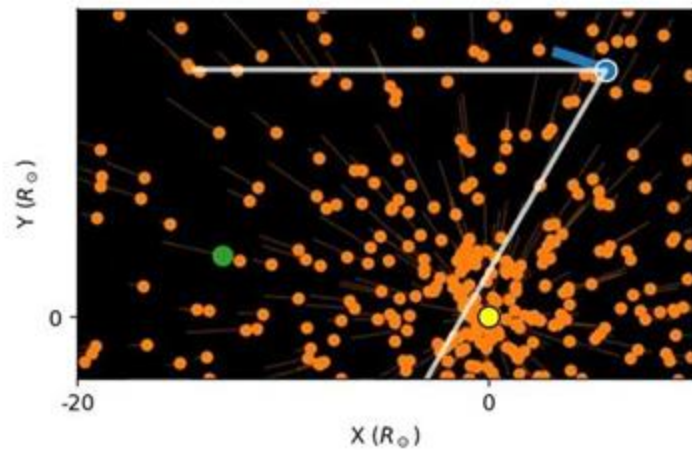
2023-06-22 02:19



2023-06-22 02:19

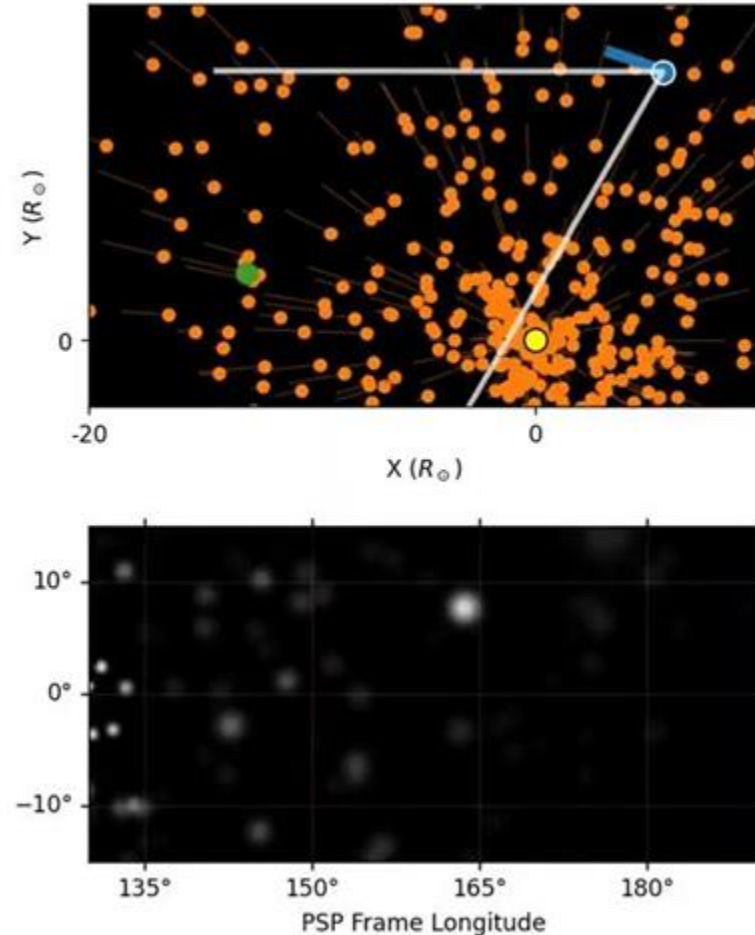


2023-06-22 02:19



# A plasma parcel at the stationary point

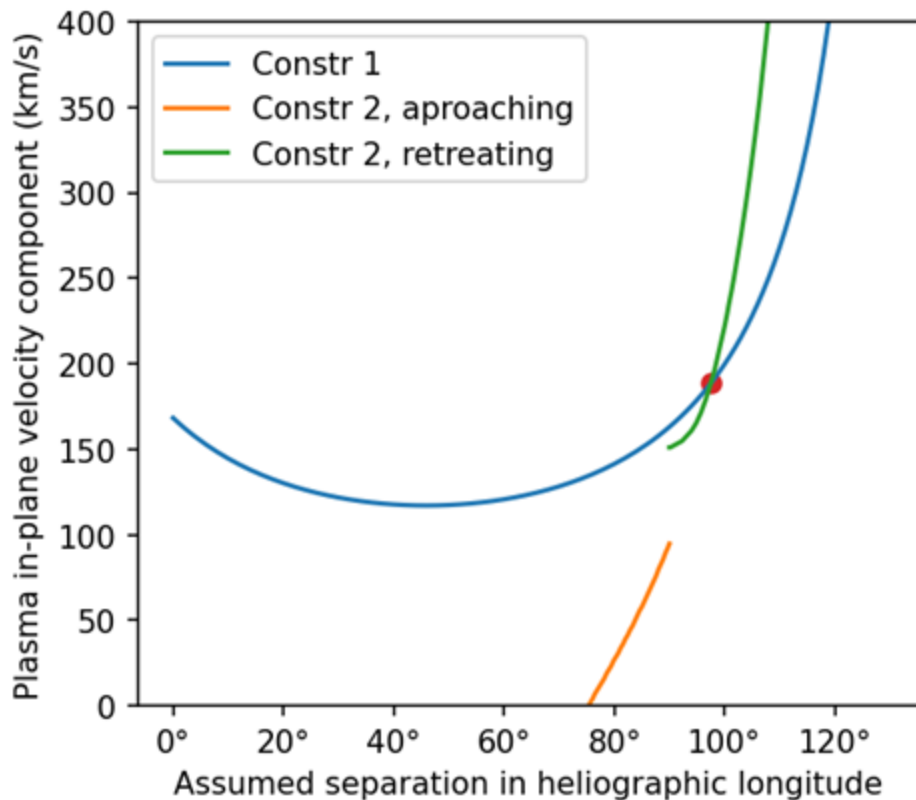
- At a fixed direction relative to PSP
  - In fixed reference frame, not helioprojective frame
- In PSP rest frame, moving directly toward/away
- Constrains velocity of parcel





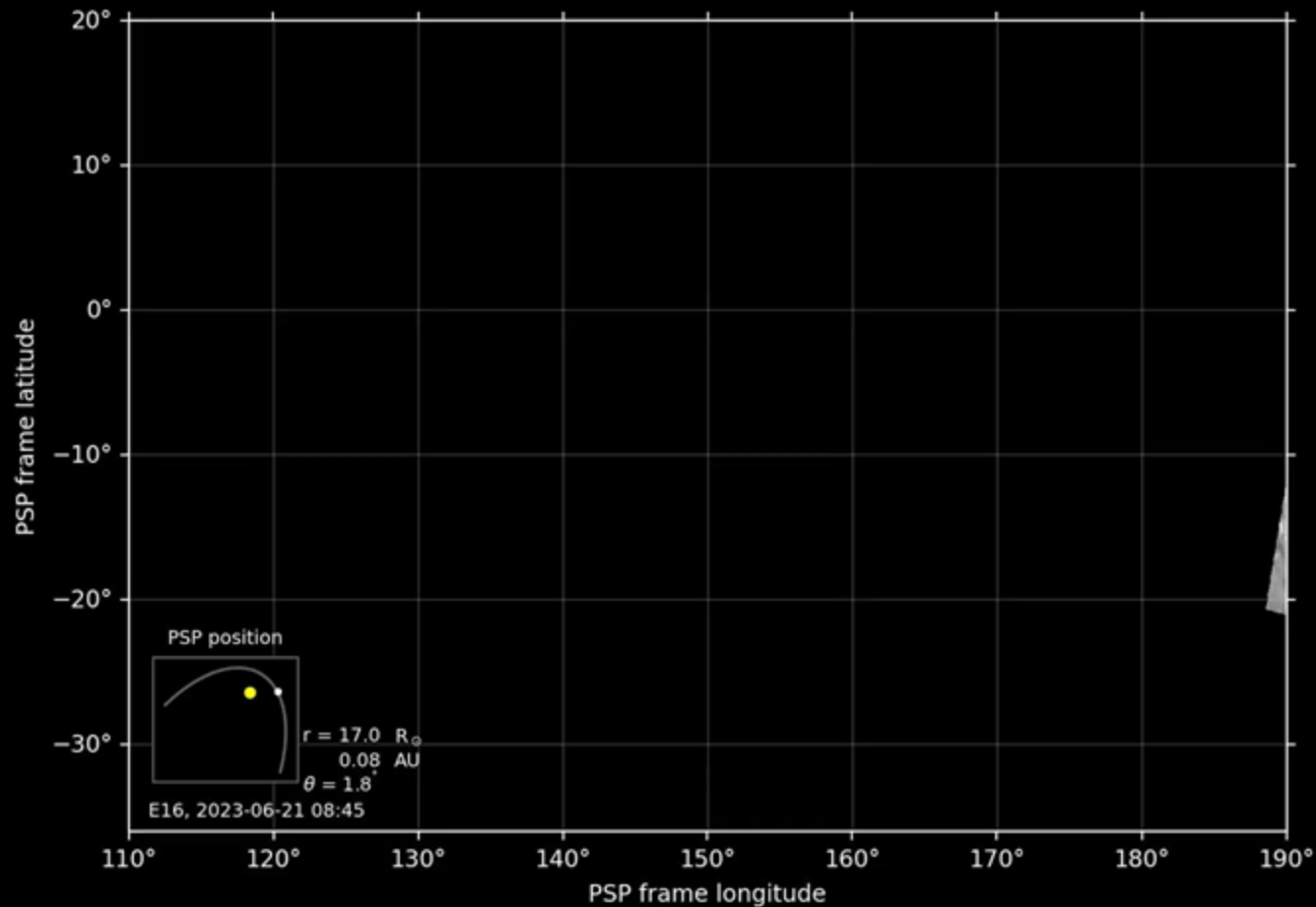


# Constraints intersect!

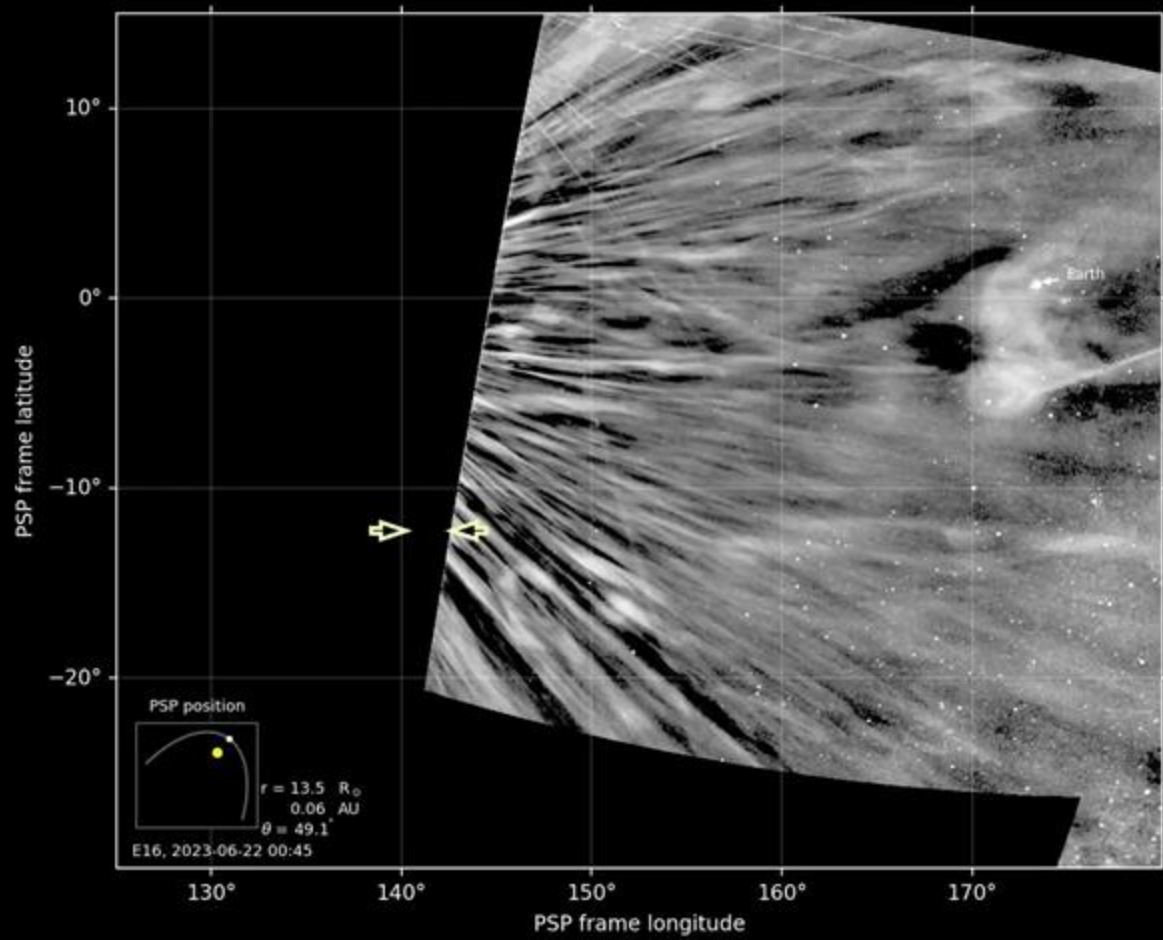


Value	Actual	Inferred
Plasma velocity	195 km/s	193 km/s
Parcel distance from Sun	15 $R_{\odot}$	15.2 $R_{\odot}$
Longitudinal separation	98°	97.5°
Plasma trajectory latitude	12°	12°

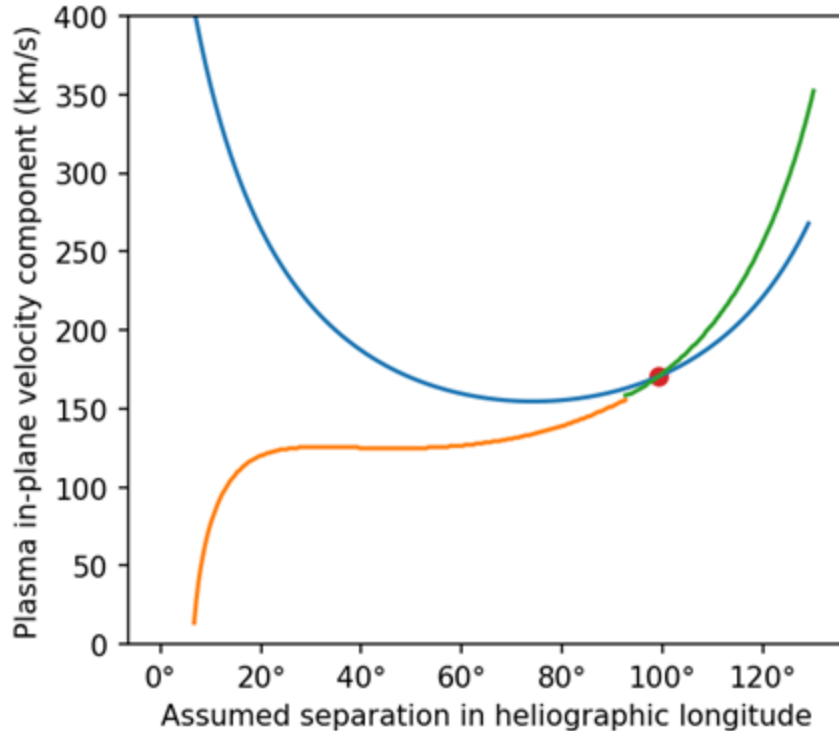
Now with  
observations!





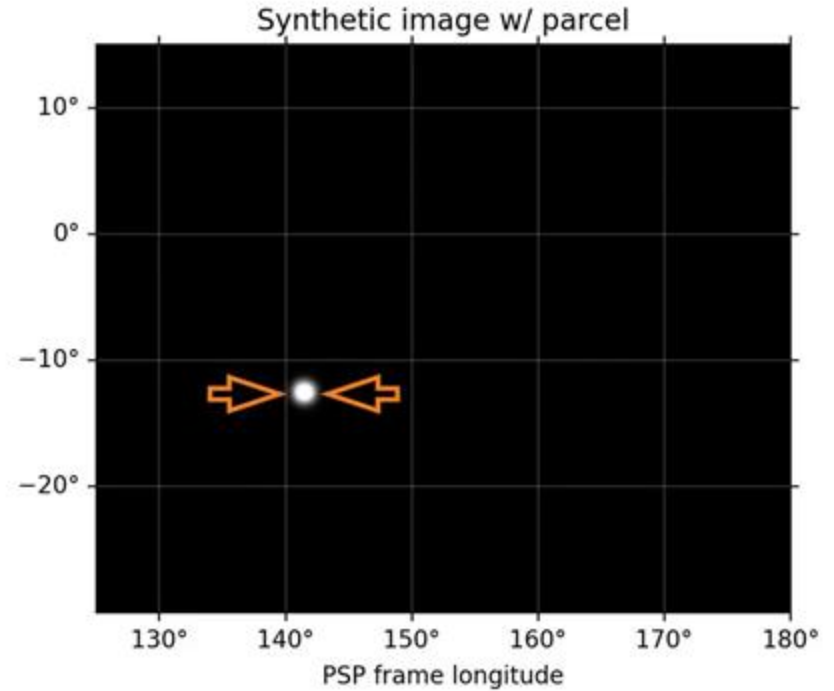
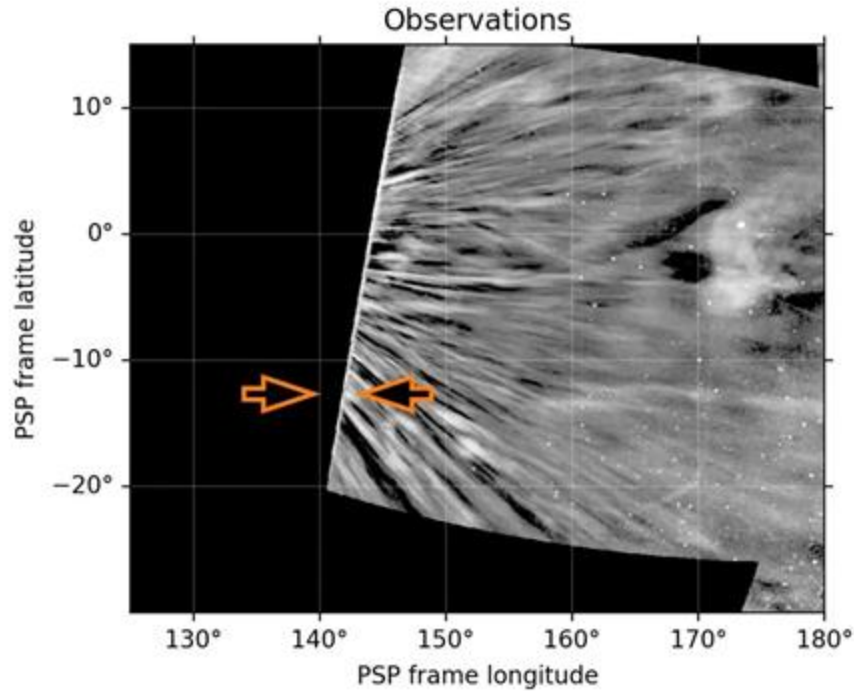


# Values inferred for observed parcel

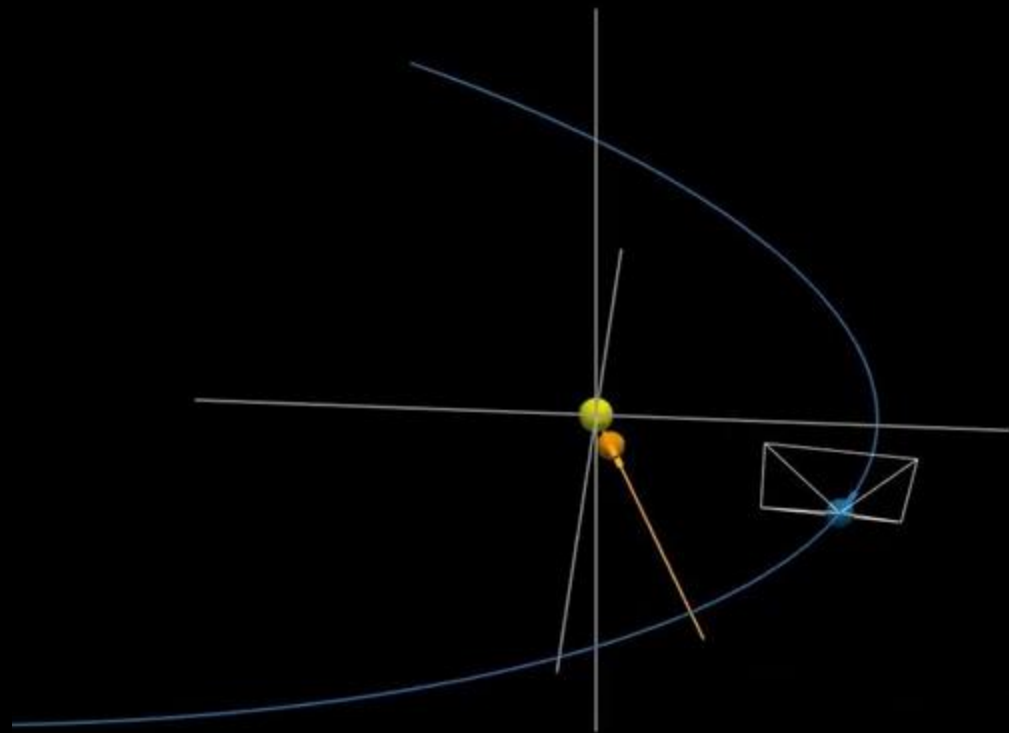


Value	Inferred
Plasma velocity	257 km/s
Parcel distance from Sun	$6 R_{\odot}$
Longitudinal separation	$99^{\circ}$
Plasma trajectory latitude	$-49^{\circ}$

These parameters reproduce the observations



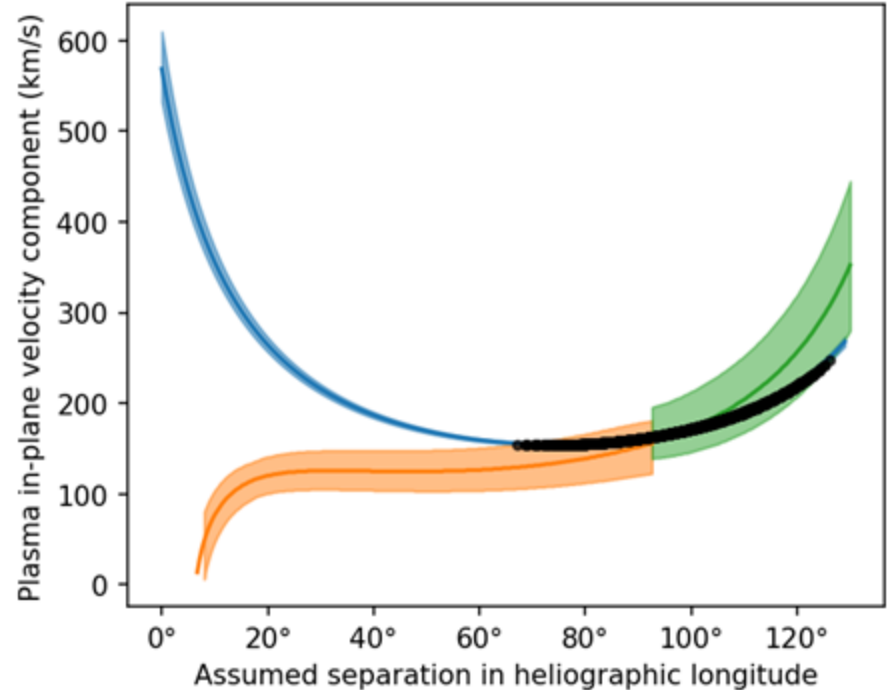
# Inferred geometry



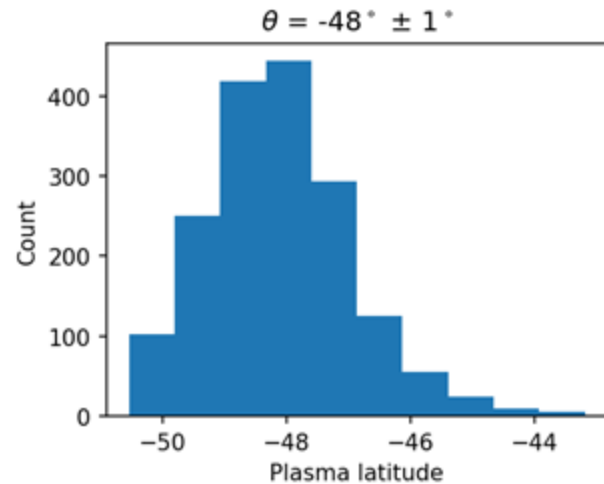
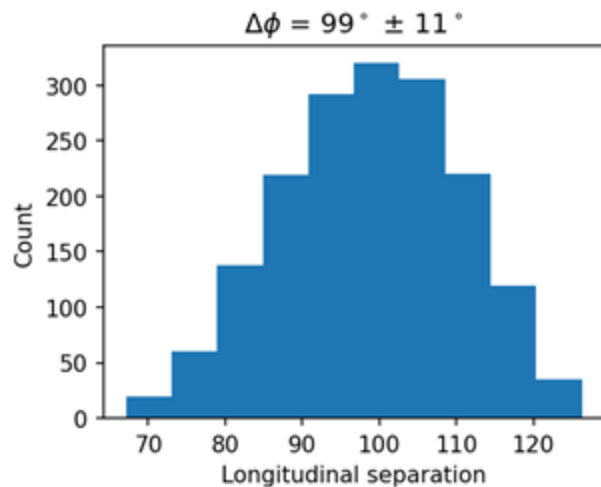
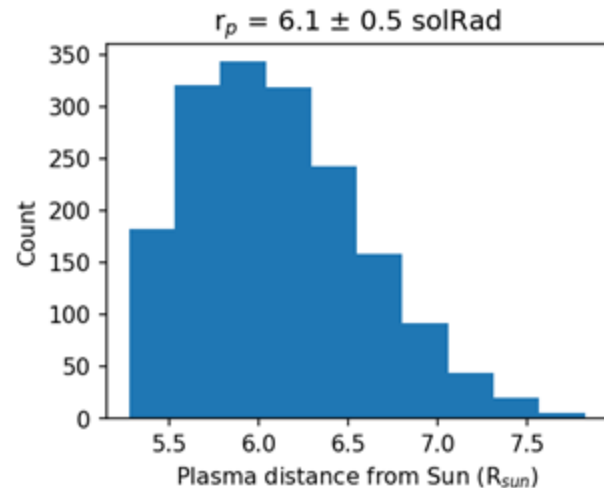
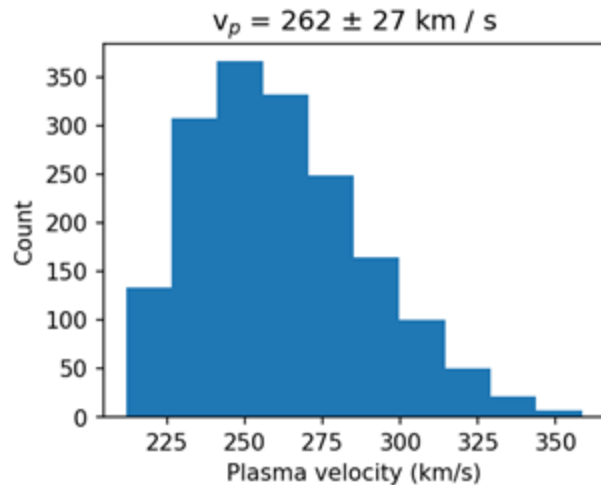
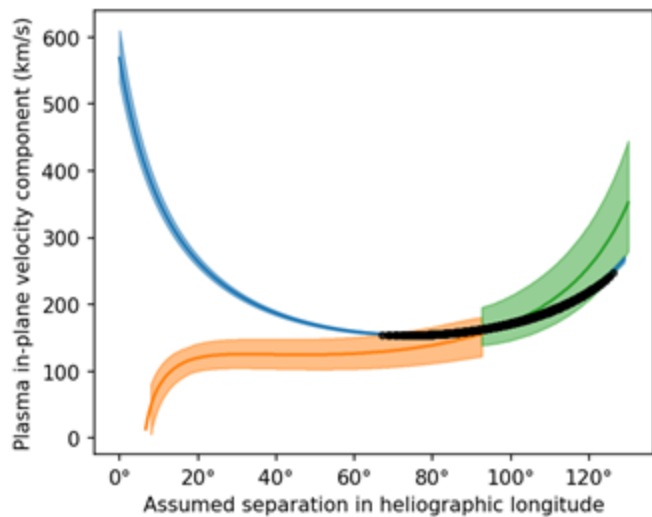
# Error analysis for observed parcel

## Allowing:

- $\pm 1^\circ$  in stationary point longitude
- $\pm 1^\circ$  in out-of-plane angle
- $\pm 5\%$  in out-of-plane angle's derivative



# Error analysis



# Conclusions

- “Stationary point” method is viable for WISPR observations
  - Limited to a subset of plasma parcels w/ right observation geometry
- One plasma parcel measured
  - $v = 260$  km/s
  - @  $6 R_{\text{sun}}$
  - @  $-49^\circ$  latitude
- Future work will catalog parcels
  - PUNCH comparison point!

