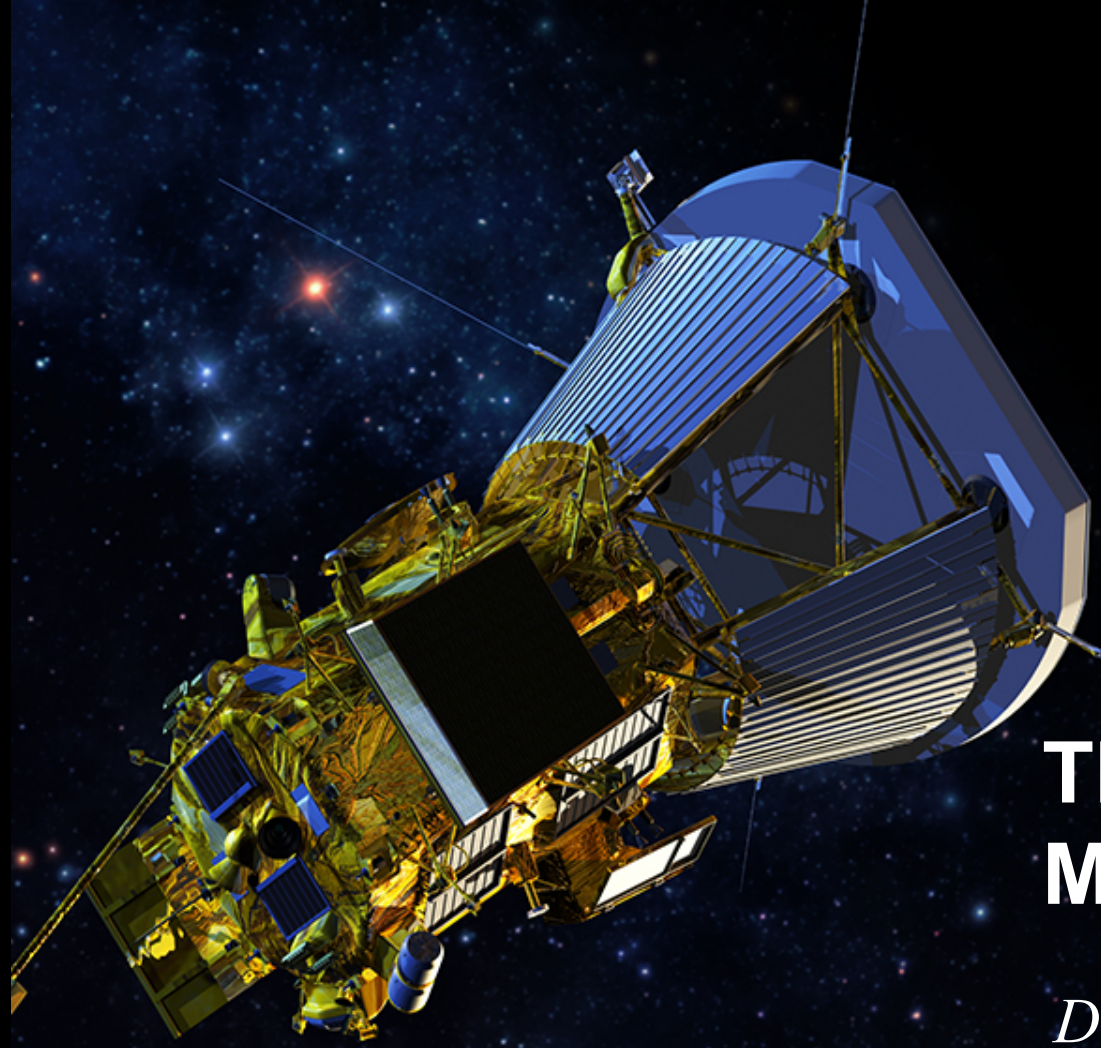


The Coolest, Hottest Mission under the Sun!!

Dr. Nicola J. Fox
Parker Solar Probe Project Scientist
JHU/Applied Physics Laboratory

Parker Solar Probe

A NASA Mission to Touch the Sun

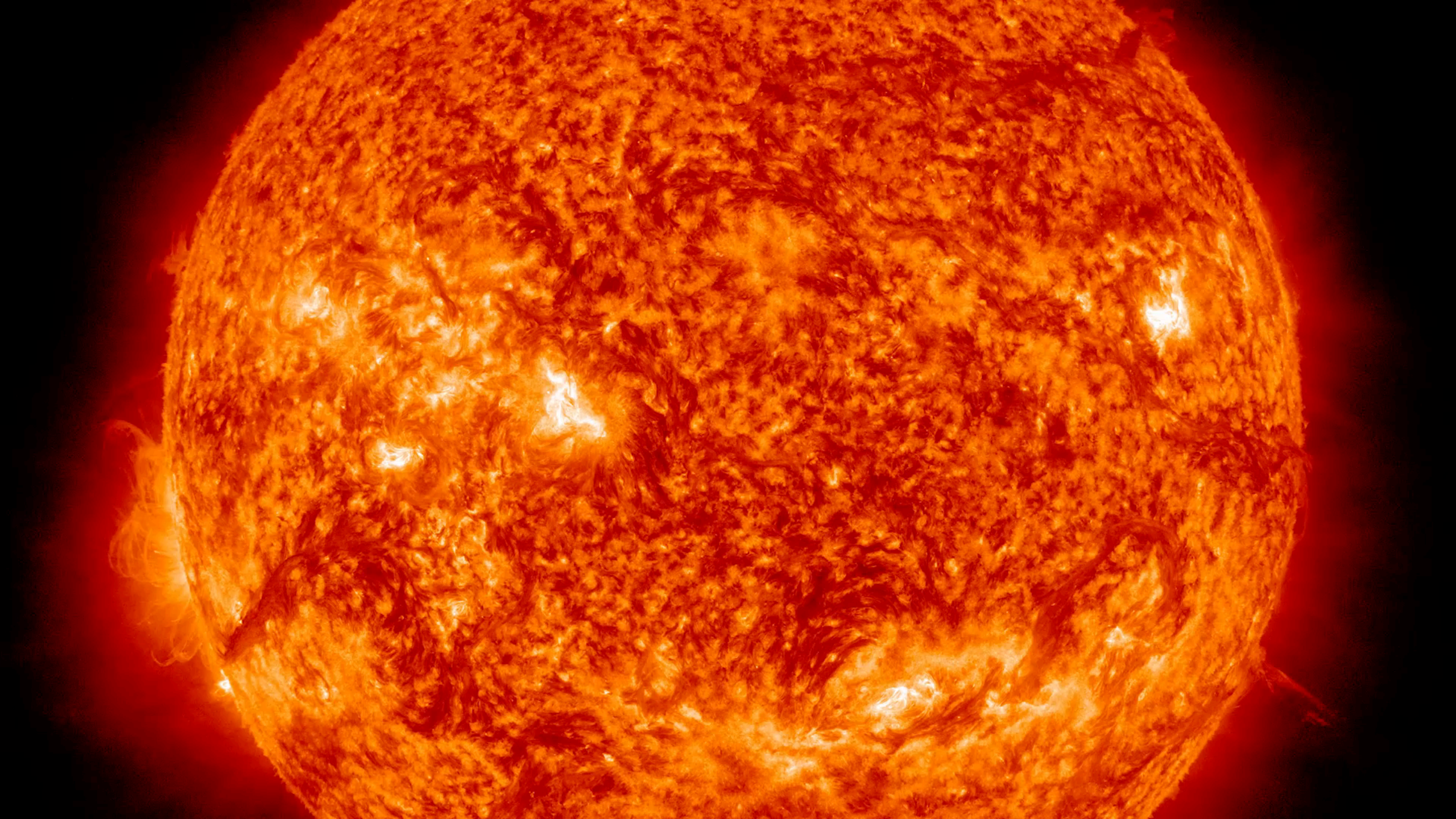
NASA

APL JOHNS HOPKINS APPLIED PHYSICS LABORATORY

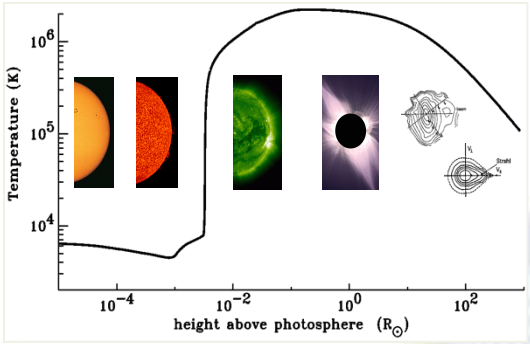

TO SUN
DR. J. A. VAN ALLEN

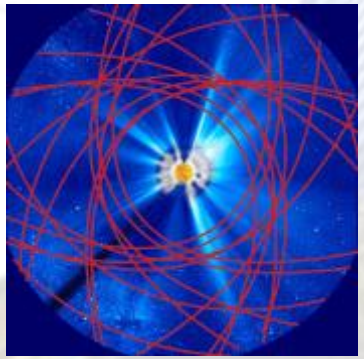
We are PARKER SOLAR PROBE!

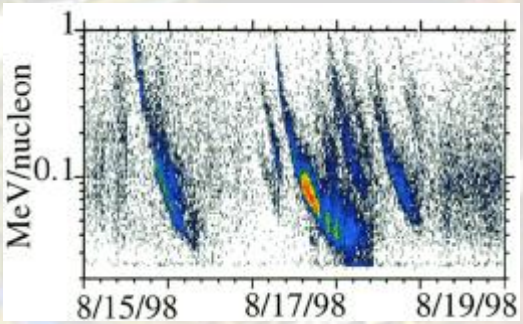
Parker, meet Parker



Parker Solar Probe Science







- **To determine the structure and dynamics of the Sun's coronal magnetic field, understand how the solar corona and wind are heated and accelerated, and determine what mechanisms accelerate and transport energetic particles.**

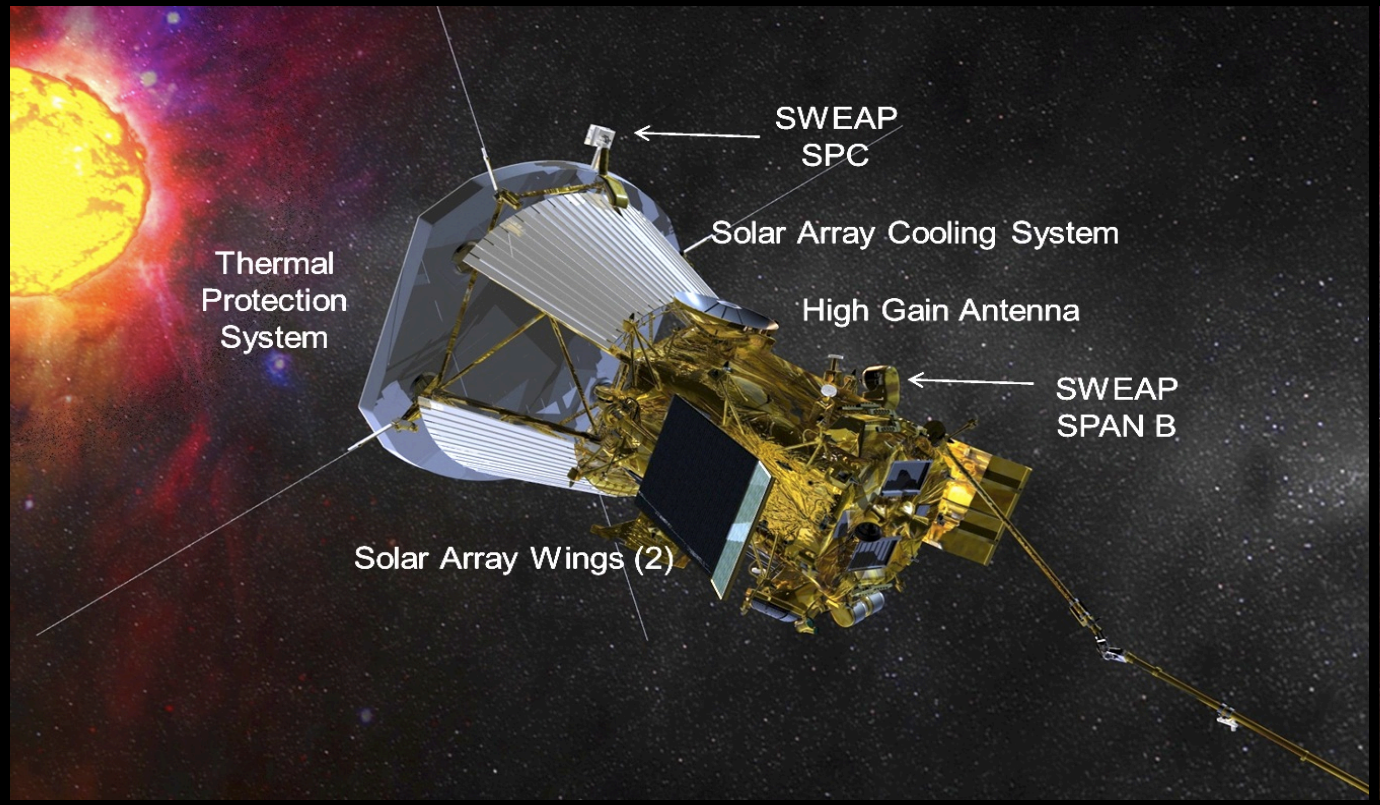
Detailed Science Objectives

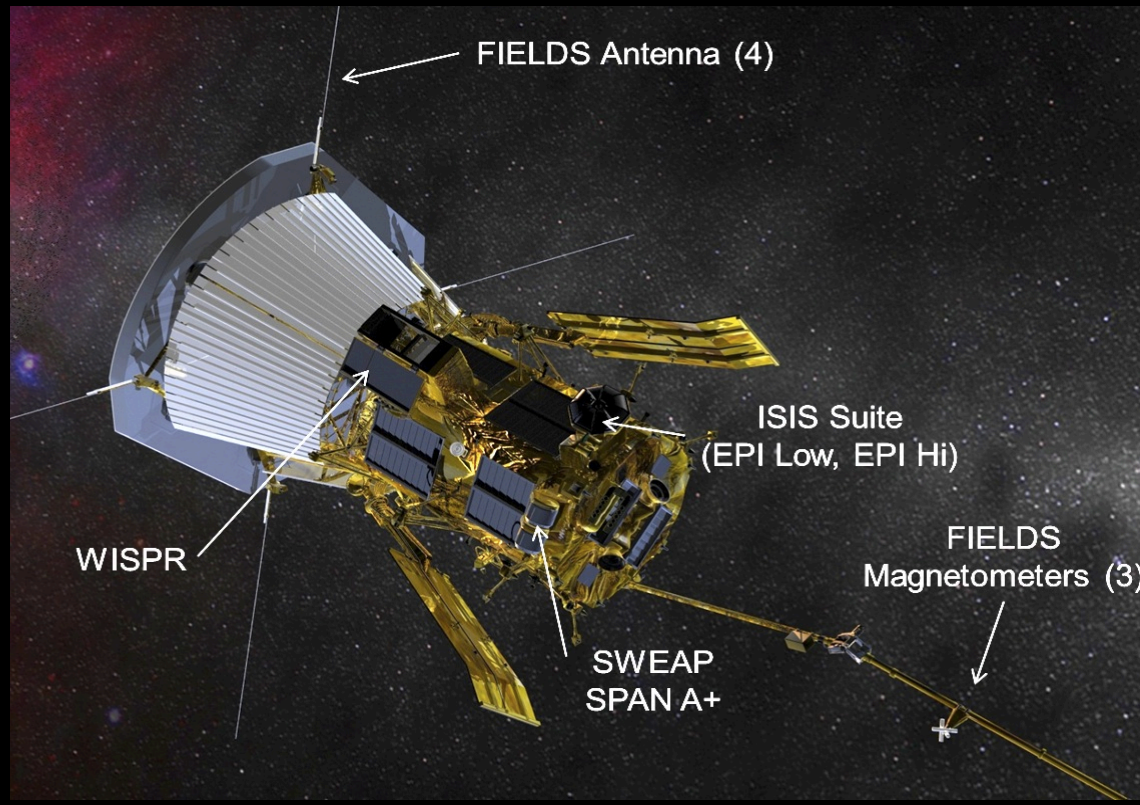
- Trace the flow of energy that heats and accelerates the solar corona and solar wind.
- Determine the structure and dynamics of the plasma and magnetic fields at the sources of the solar wind.
- Explore mechanisms that accelerate and transport energetic particles.

Launch

- Launch Window: July 31 – August 19, 2018
- Launch Site: NASA's Kennedy Space Center, Florida
- Launch Vehicle: Delta IV-Heavy with Upper Stage

At closest approach, the front of the heat shield will be at 1,400°C (2500°F), but the payload will be a little above room temperature 30°C (85°F)



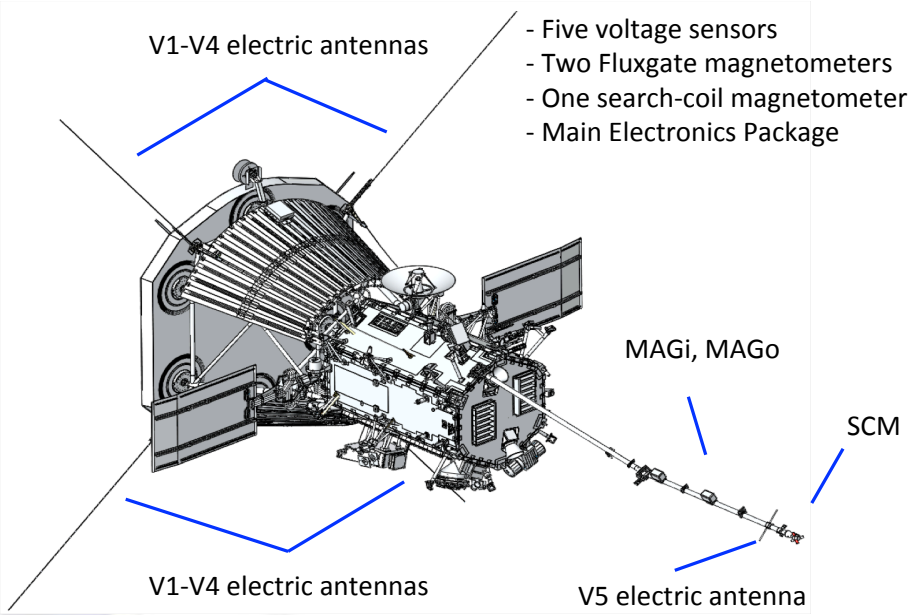


A further challenge: spacecraft needs to be compact & lightweight, & we need to keep the solar arrays cool

Parker Solar Probe Science Investigations: FIELDS

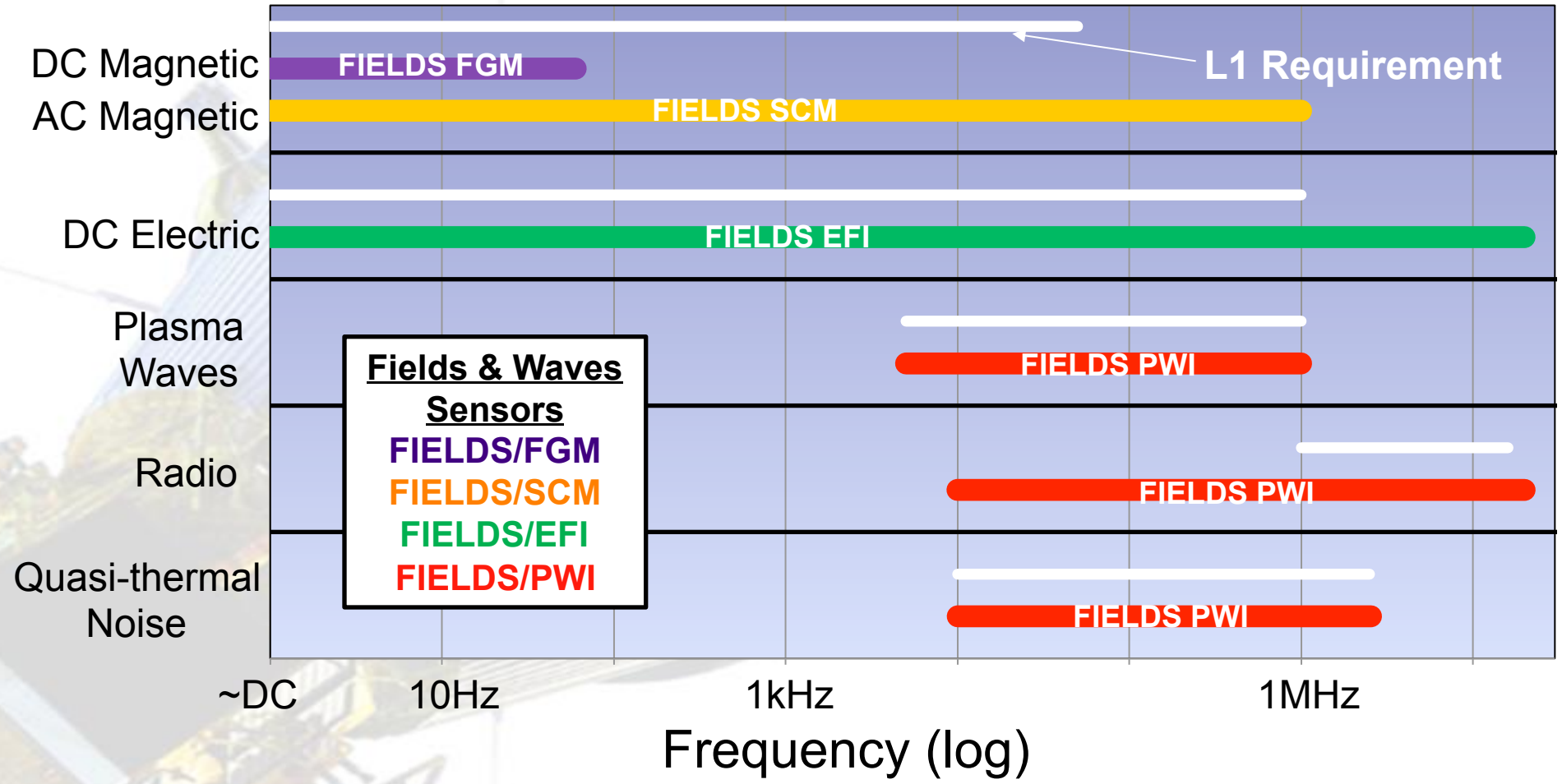
- **Fields Experiment (FIELDS):** This investigation will make direct measurements of electric and magnetic fields and waves, Poynting flux, absolute plasma density and electron temperature, spacecraft floating potential and density fluctuations, and radio emissions.

FIELDS Investigation



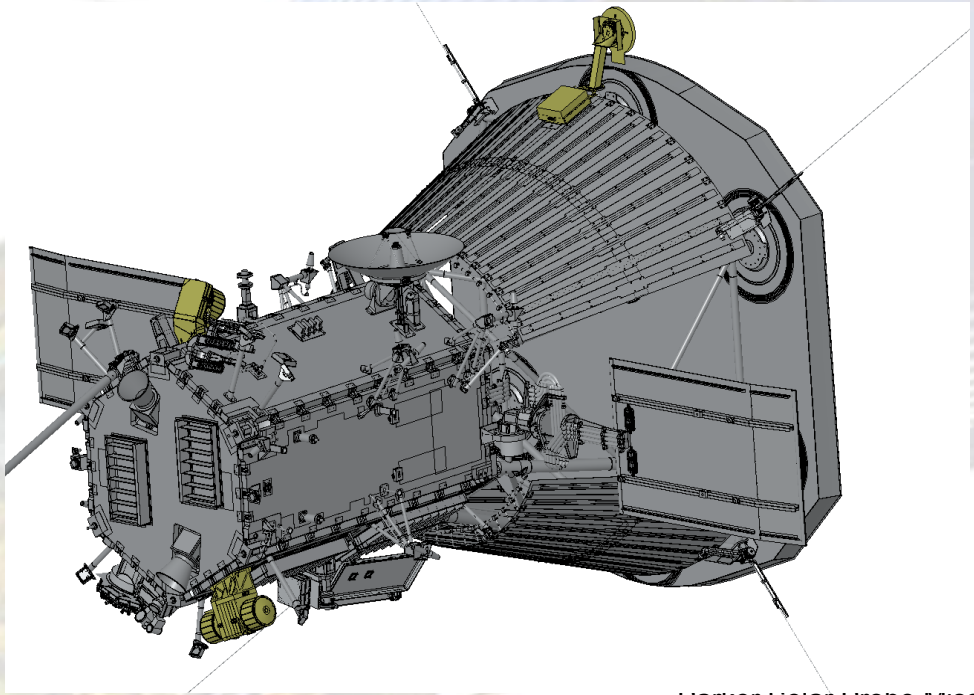
FIELDS PI
Prof. Stuart Bale
University of California, Berkeley

Fields & Waves Instrument capabilities

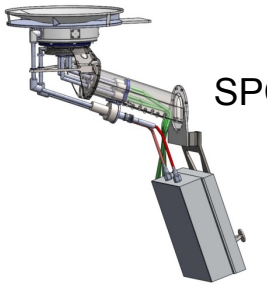


Solar Wind Electrons Alphas and Protons (SWEAP) Investigation

- Velocity distribution functions of the most abundant particles in the solar wind -- electrons, protons and helium ions, minor ions with m/q resolution
- Bulk properties such as velocity, density, and temperature at 8 Hz, heat flux and phase space variations at 150 Hz, field line topology, heat flux

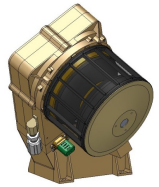


Solar Probe Cup (SPC)
2 Solar Probe ANalyzers (SPAN)

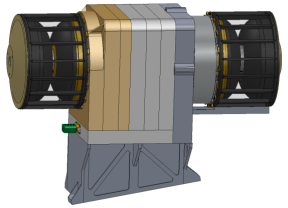


SWEAP Investigation

SPAN-B



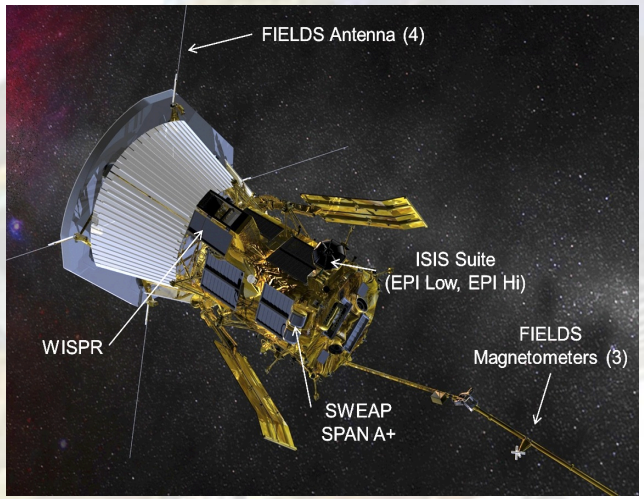
SPAN-A+



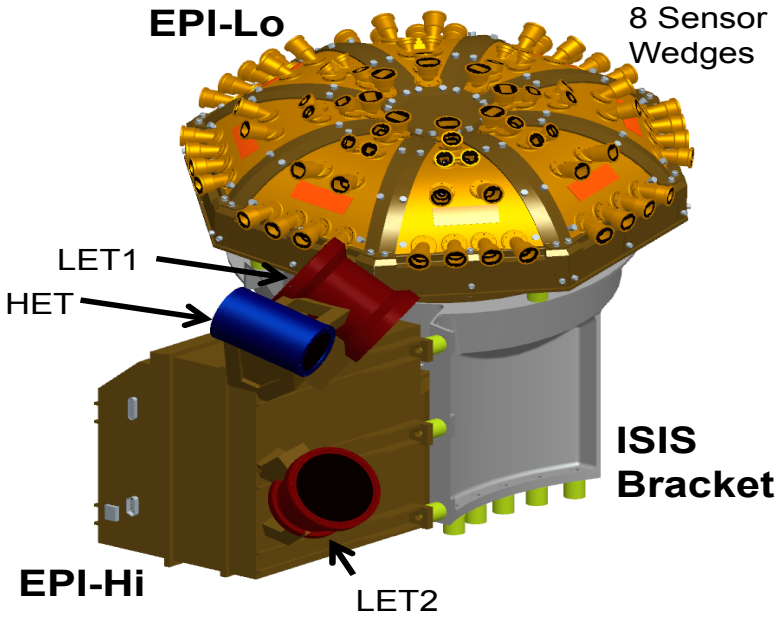
SWEAP PI
Prof. Justin Kasper
University of Michigan/ Smithsonian Astrophysics Observatory

Parker Solar Probe Science Investigations: IS⊙IS

- **Integrated Science Investigation of the Sun (IS⊙IS)**: This investigation makes observations of energetic electrons, protons and heavy ions that are accelerated to high energies (10s of keV to 100 MeV) in the Sun's atmosphere and inner heliosphere, and correlates them with solar wind and coronal structures.



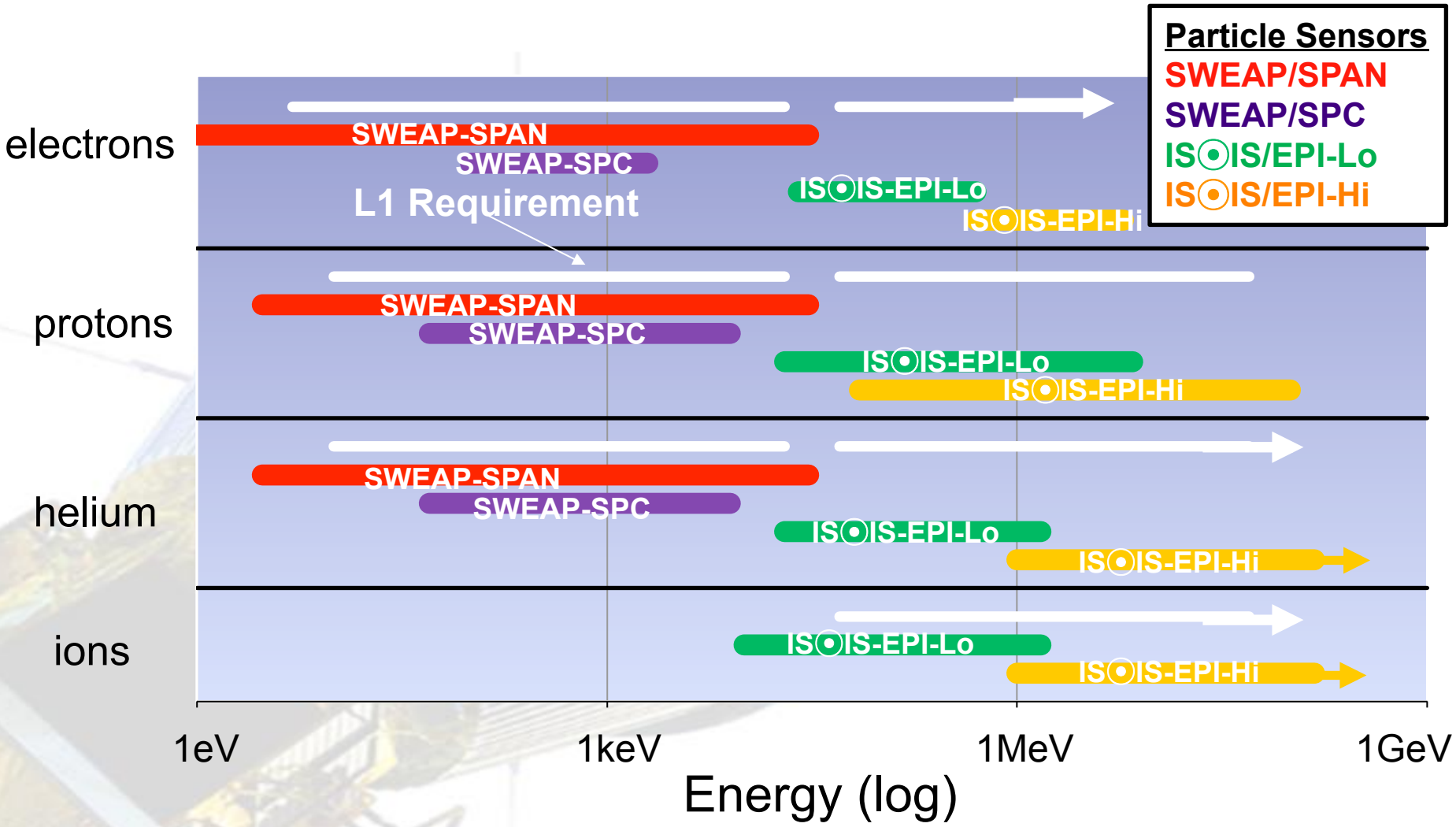
High energy Energetic Particle Instrument (EPI-Hi)
Low energy Energetic Particle Instrument (EPI-Lo)



IS⊙IS Investigation

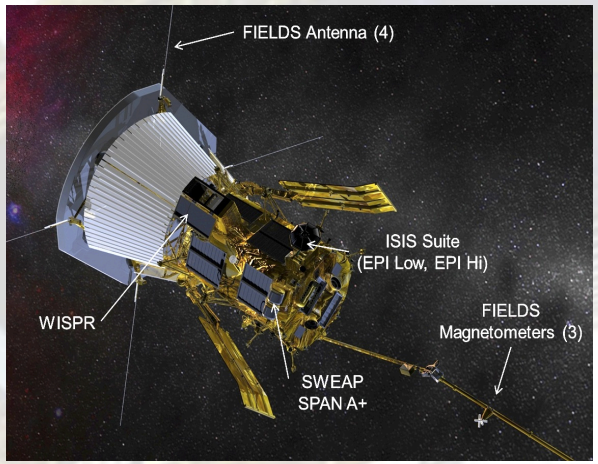
IS⊙IS PI
Dr. David McComas
Princeton University

Particle Instrument capabilities

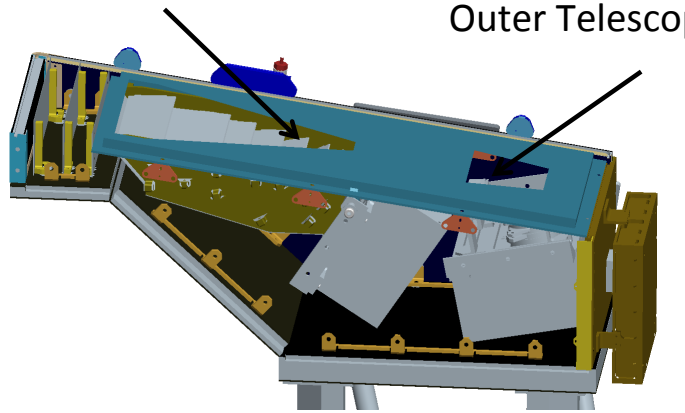


Parker Solar Probe Science Investigations: WISPR

- **Wide-field Imager for Solar PRobe (WISPR)**: These telescopes will take images of the solar corona and inner heliosphere. The experiment will also provide images of the solar wind, shocks and other structures as they approach and pass the spacecraft. This investigation complements the other instruments on the spacecraft providing direct measurements by imaging the plasma the other instruments sample.



White light imager

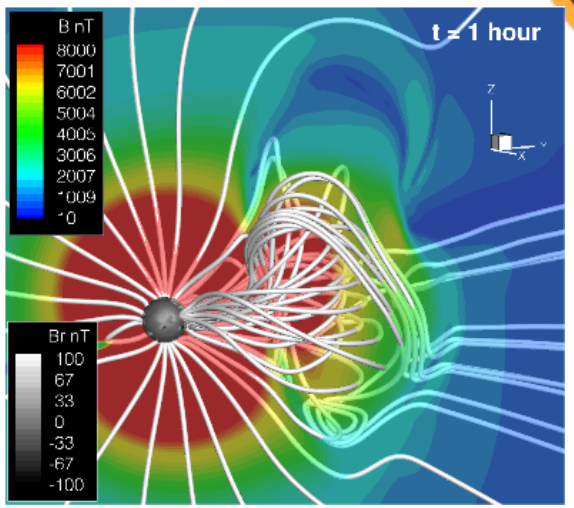


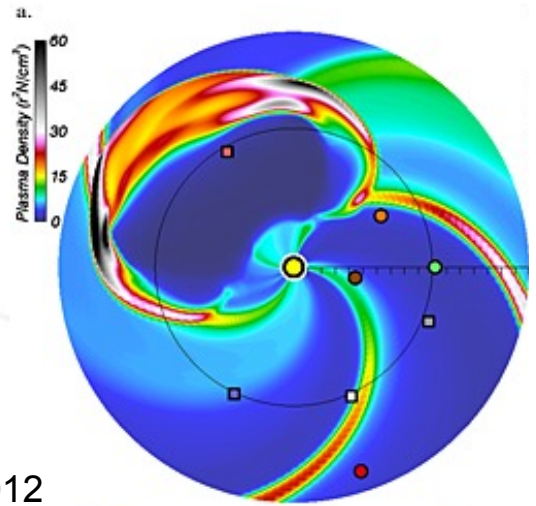
WISPR Investigation

WISPR PI
Dr. Russell Howard
Naval Research Laboratory

Modeling: Providing the missing piece

- In-situ data from within 0.25 AU will be available shortly after each orbit for ingestion into the coronal, solar wind and global heliospheric models
- Contact Nicky.Fox@jhuapl.edu or Nour.Raouafi@jhuapl.edu

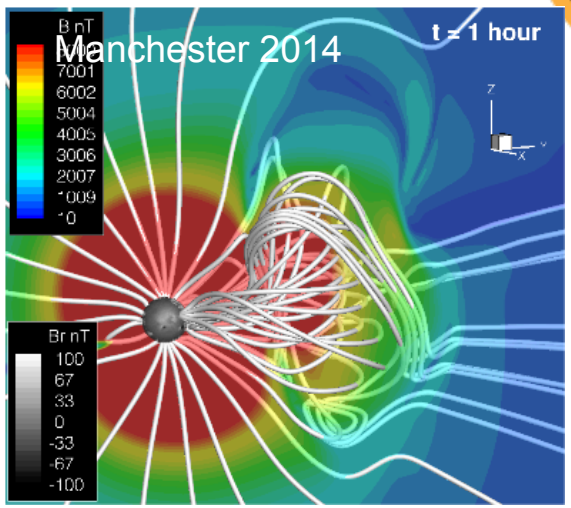


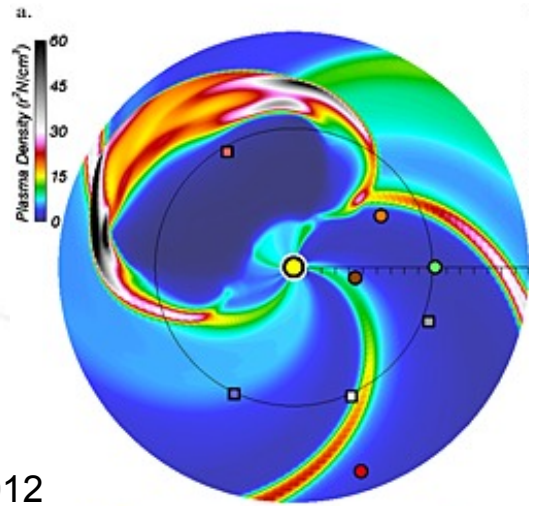


Baker et al., 2012

Modeling: Providing context for observations

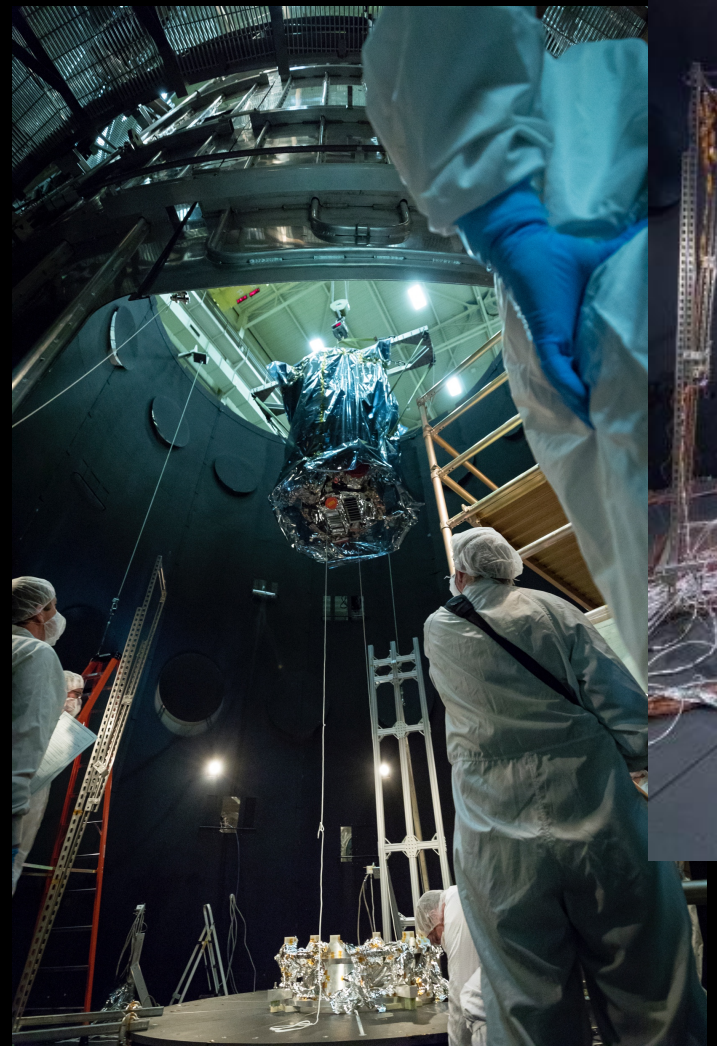
- PSP would benefit invaluably from knowing the *mapping between the spacecraft and the solar surface* though each orbit
- Best way to approach this would be through global simulations driven by concurrent photospheric fields and other supporting observations
- Global simulations of CMEs would also provide critical context when we fly through CMEs
- Even better, predictions from more than one model to validate the models by testing their predictions
  - Think of the value of the close data, the radial scans, and the longitudinal scans
- Urge everyone with the interest to pursue means for providing such simulations

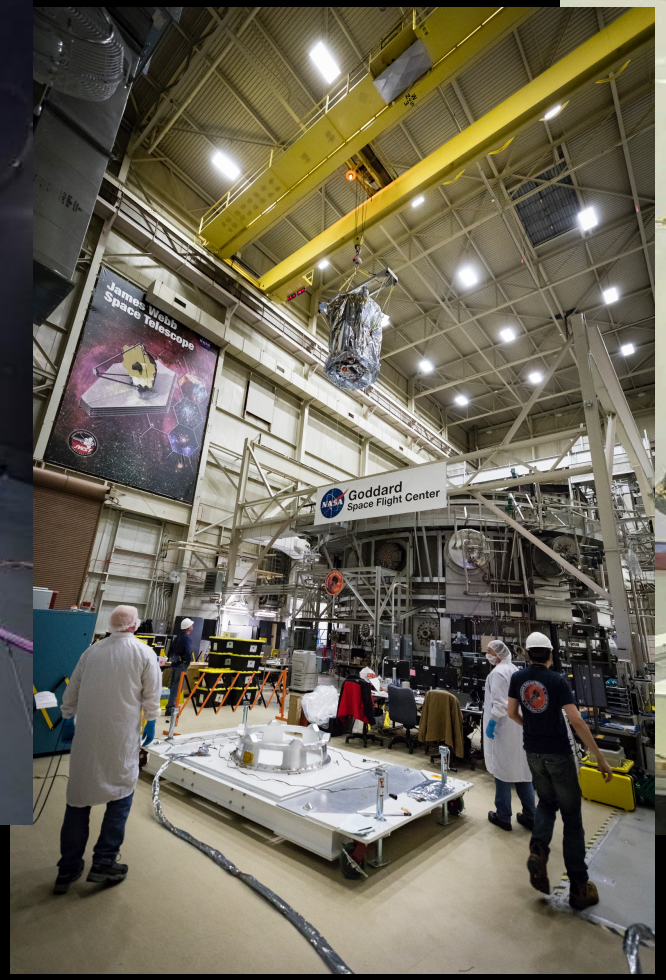


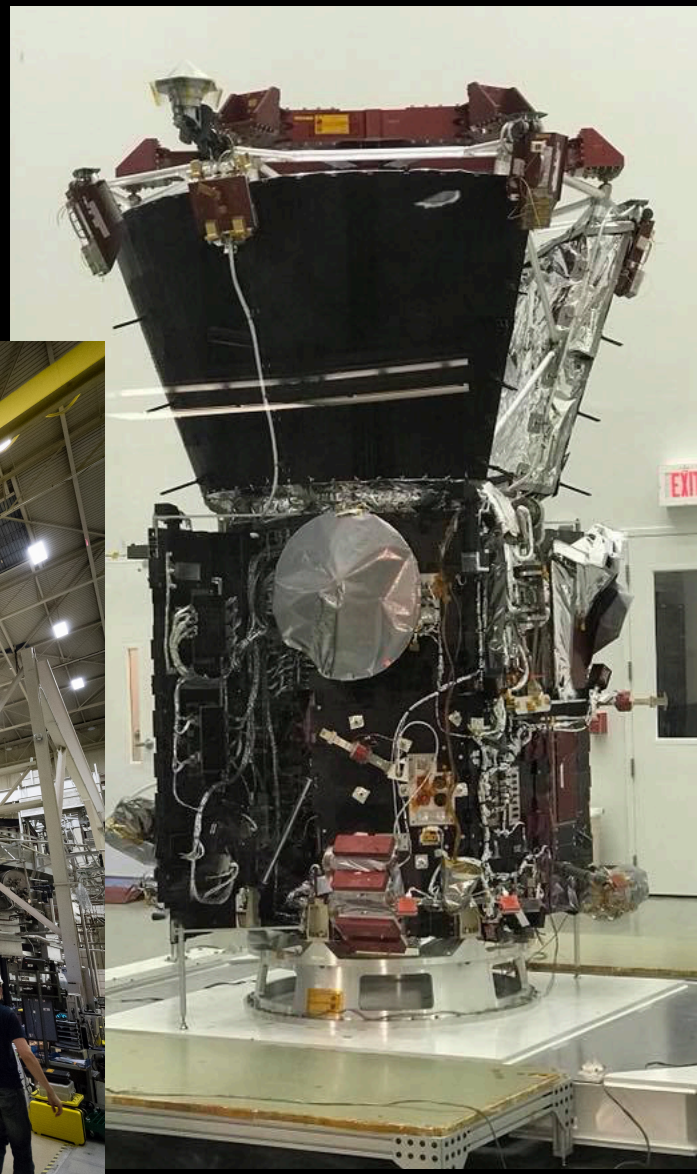


Baker et al., 2012

Finishing environmental testing

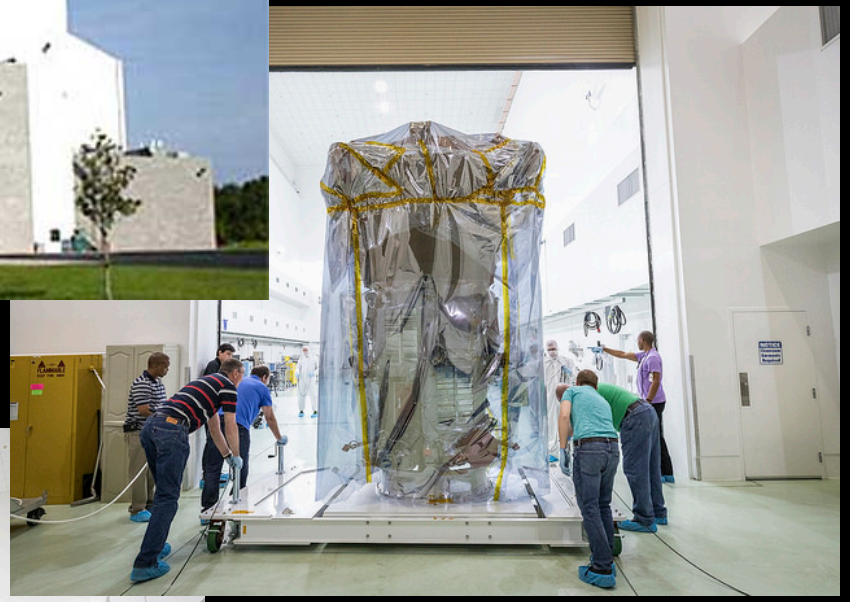


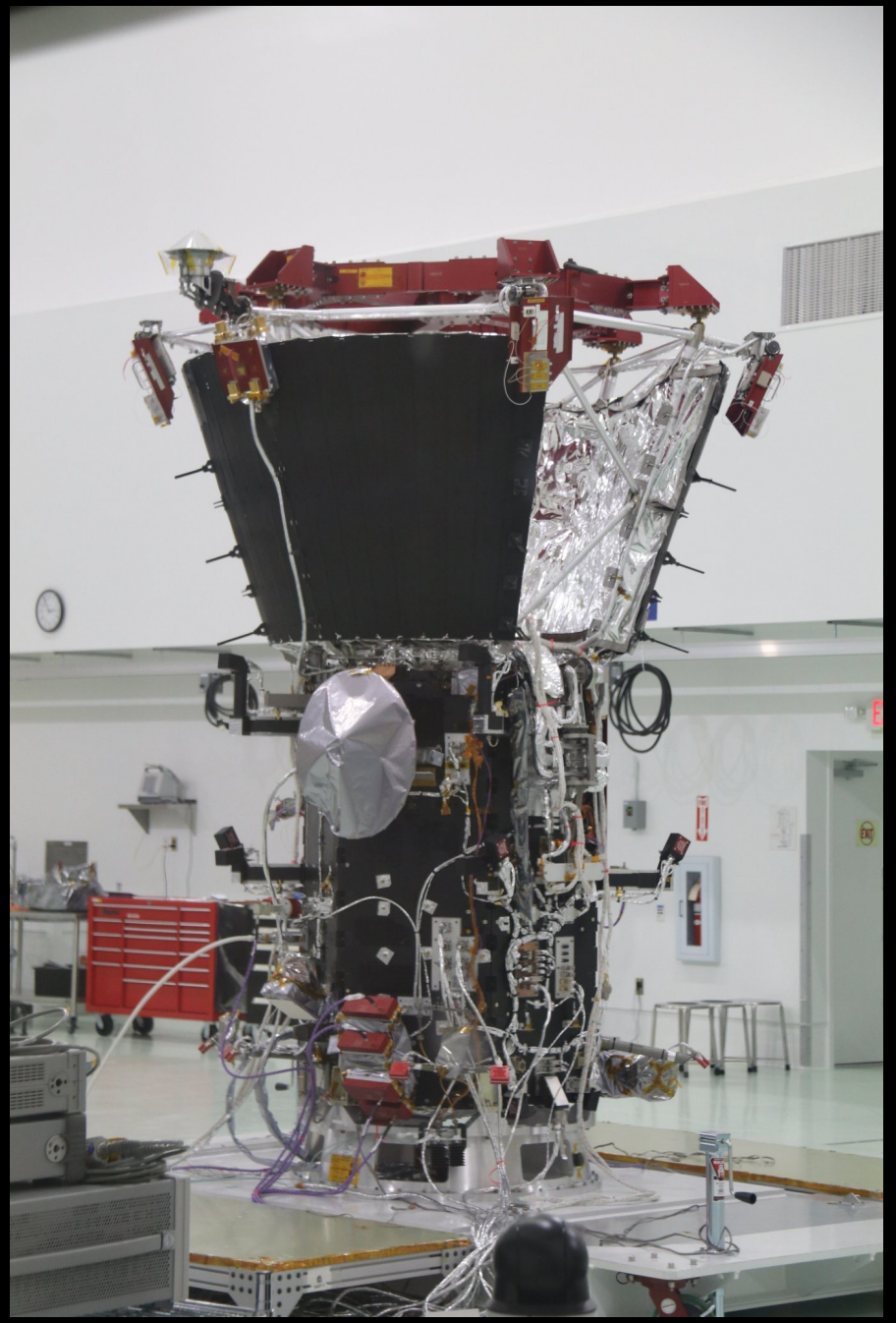




Transitioning to Florida

PSP arrives at her temporary home





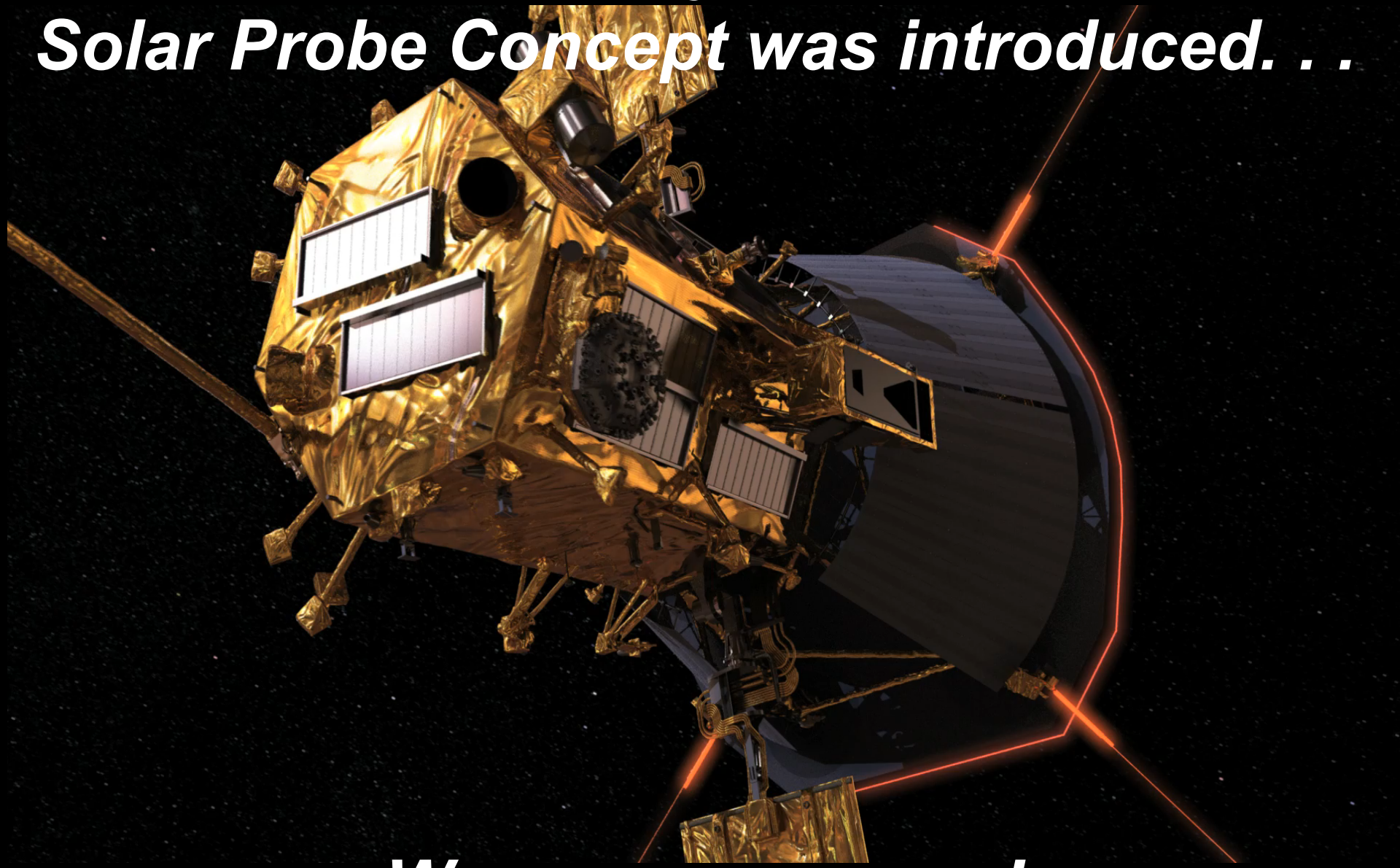
Delta IV Heavy baby – ‘cos that’s the way we roll

Send Your Name to the Sun!

- Go.nasa.gov/HotTicket

🌞🚀

It has been almost 60 years since the Parker Solar Probe Concept was introduced. . .



We are on our way!

- http://parkersolarprobe.jhuapl.edu
- Facebook: @parkersolarprobe
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- Send your name to the Sun
  - Go.nasa.gov/HotTicket