

Disentangling Expansion Effects and Collisional Relaxation in the Solar Wind

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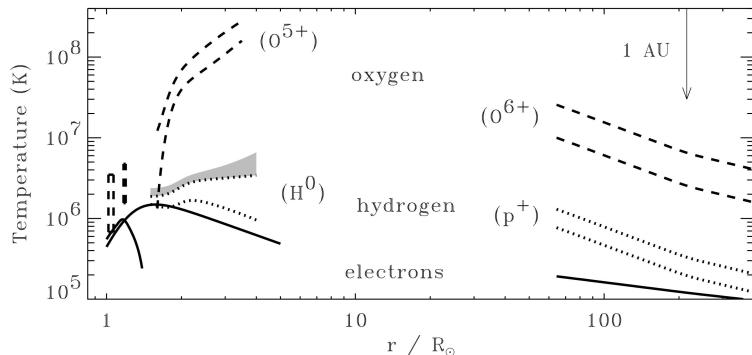
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Radial Evolution of the Solar Wind



Cranmer (*SSRv*, 2002)

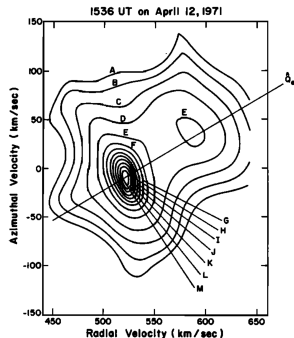
- ▶ Example above: trends in *average* temperature by species
- ▶ In-situ observations from past (e.g., *Helios* and *Ulysses*) and future (e.g., *Parker Solar Probe* and *Solar Orbiter*) missions
- ▶ Complex interplay of global and local phenomena in solar-wind expansion

Global Versus Local Processes

Principal Science Question

How do global expansion and collisional relaxation determine the state of the solar wind?

Expansion	Large-scale changes to fluid properties
Coulomb collisions	Inter-particle exchanges of energy/momentum
Microinstabilities	Limits on deviations from equilibrium
Turbulence	Spectra of fluctuations



Feldman et al. (*JGR*, 1973)
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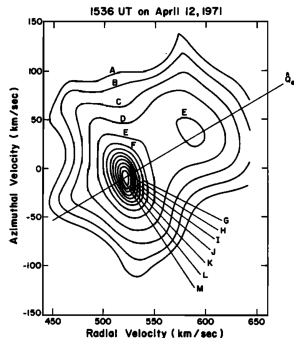
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Velocity distribution functions (VDFs):

- ▶ Distributions of velocities of individual particle
- ▶ Measured with in-situ instruments
- ▶ Deviations from thermal equilibrium: indications of plasma's history



Feldman et al. (*JGR*, 1973)

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Session Highlights

Scene-Setting Speakers:



Benjamin L. Alterman
University of Michigan
Collisions in an Expanding Solar Wind



Rohit Chhiber
University of Delaware
Numerical Simulations of the Expanding Solar Wind

Preparation for Upcoming Missions:

- ▶ *Parker Solar Probe* and *Solar Orbiter*
- ▶ Groundwork for the interpretation of observations

Fresh Perspectives:

- ▶ Over 85% of abstracts from students
- ▶ Both scene-setting speakers are students