Disentangling Expansion Effects and Collisional Relaxation in the Solar Wind

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Example above: trends in \textit{average} temperature by species

- In-situ observations from past (e.g., \textit{Helios} and \textit{Ulysses}) and future (e.g., \textit{Parker Solar Probe} and \textit{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)  
*IMP-6*
Global Versus Local Processes

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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)  
IMP-6
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