

## Planned Sessions for 2004 SHINE Working Group III – CMEs and SEPs

*Tuesday AM (WG3)*

### **Session #1: Theory and Observations: What causes the energy-dependent Fe/O in large SEP events?**

In this session we hope to address the following question related to the campaign events. What causes the increase in Fe/O with energy in some large SEP events? These enhancements are associated with "exponential-like" turnover in the energy spectra and are therefore species-dependent. From the viewpoint of shock acceleration theory, exponential-like spectra are associated with spatial and temporal limitations. The exact point at which the spectrum deviates from a power law could depend on a number of things such as shock-normal angle, scattering mean-free path, shock strength, Q, M, etc. This session will attempt to de-convolve these puzzling observations into a coherent picture.

*Tuesday PM (WG3, WG1\*)*

### **Session #2: Characteristics of impulsive SEP events and their solar origin**

Recent measurements from ACE and Wind have shown the presence of ultra-heavy nuclei (mass > 100 AMU) in 3He-rich SEP events with enhancement factors that increase with mass and range between ~40-200 times the solar-system abundances. These new measurements provide us with a great opportunity to test and constrain various particle acceleration models that are believed to operate during the so-called impulsive SEP events. This purpose of this session is to discuss key properties of such events in terms of their solar origins and current theoretical predictions.

*Wednesday AM (WG3, WG1\*, WG2\*)*

### **Session #3: Suprathermal-through-relativistic electrons during SEP events at 1 AU, their associated radio emissions and solar signatures**

This session will investigate the relationship between electrons with energies ranging from hundreds of eV to tens of MeV and the associated radio emissions (e.g., Type II and III bursts) to identify their times of acceleration near the Sun and subsequent injection into the interplanetary medium. Such timing studies provide an essential first step toward establishing the connection between *in situ* particle observations made near the Earth, and the associated phenomena near the Sun i.e., CME-driven coronal shocks or flares. Such studies are critical for improving our understanding of

the acceleration processes and the interplanetary transport of electrons observed at 1 AU.

*Thursday AM (WG3, WG1\*, WG2\*)*

### **Session #4: Extreme SEP Events, their solar origin and impact on geospace**

This session is motivated by the extreme solar-terrestrial events of October and November 2003 that were observed by many ground-based and spaceborne instruments. Such disturbances are important both in the framework of scientific investigations of the near-Earth environment and because of their impacts on technological systems. This purpose of this session is to discuss similarities and differences between the well-documented extreme events of cycle 23 and those observed during previous solar cycles. The session will be focused on comprehensive discussions of the solar origin of such extreme events and their associated impacts on geospace.

*Thursday PM*

*(WG3, WG1\*, WG2\*)*

### **Session #5: Long-term effects of solar variability on the interplanetary magnetic field strength, the galactic cosmic radiation in the heliosphere, and Earth's climate**

Cosmogenic radioactive isotopes with long half-lives such as  $^{10}\text{Be}$  and  $^{14}\text{C}$  are formed as a consequence of the interaction of galactic cosmic rays (GCRs) with nitrogen and oxygen in the Earth's atmosphere. The energy spectrum of GCRs is modulated by the heliospheric magnetic field, which is governed by solar activity. Thus the cosmic-ray flux and therefore also the production rate of these isotopes depend on the level of solar activity i.e., the higher the activity the lower is the cosmic ray flux and the  $^{10}\text{Be}$  and  $^{14}\text{C}$  production rates.  $^{10}\text{Be}$  is removed from the atmosphere after ~1-2 years by precipitation in polar ice sheets. Thus, changes in the concentrations of  $^{10}\text{Be}$  preserved in annual layers in ice cores reflects changes in the helio- and geo-magnetic modulation of the cosmic ray flux at Earth over many millennia. These records can therefore be used to infer solar activity levels over the distant past and understand the relationship between the dynamic Sun and changes in the Earth's climate. This session aims to characterize solar activity, the state of the heliosphere, and geomagnetic activity over the past ~1000 years.