What do we learn from observations and modeling of the solar corona for understanding solar energetic particle events?

N. Nitta & S. Masson
A lot of contributions and topics

Which magnetic topologies are favorable for an efficient acceleration and escape of SEPs? Viacheslav Titov
What are the solar source regions of energetic 3He-rich SEPs? Glenn Mason

- In-situ measurements

P030. Solar Energetic Particle Events During the First ~Six Years of the STEREO Mission, Ian Richardson
P035. Study of 2012 May 17 GLE with PAMELA Neeharika Thakur
P038. Characteristics of the Large Fe rich SEP Event of 11 April 2013, Christina Cohen

- Coronal observations:

P039. Large Scale Coronal Propagating Fronts and Solar Energetic Particle Events, Nariaki Nitta

- Model of the interplanetary transport

P031. The role of field line meandering in the early evolution of a Solar Energetic Particle Event, Timo Laitinen
P036. Longitudinal distribution of solar energetic particles, Ming Zhang
P041. SHILLELAgh: A data driven solar wind model for studying solar energetic particle events, Paul Higgins
P042. An investigation of parallel and perpendicular diffusion coefficients in the SEP dropouts phenomenon: A comparison of simulation results with ACE observations, Gang Qin

- Model of the corona / eruption

P032. Pseudo Streamer Structures in the 2010 August 1-2 CMEs: PFSS verses MHD model, Viacheslav Titov
P033. A Model for the Escape of Solar Flare Accelerated Particles, Sophie Masson

- Acceleration models and observations

P034. Features of coronal SEP acceleration in a globally modeled realistic CME, Kamen Kozarev
P037. SEP Acceleration and Transport Model Based on Multiple Advected Magnetic Field Lines, Igor Sokolov
P040 'TWIN CME' SCENARIO AND LARGE SOLAR ENERGETIC PARTICLE EVENTS, Gang Li
What do we learn from the observations?
multi-instruments analysis to get the solar source of the $^3$He-rich events

G. Mason (invited)
Distribution of the $^{3}$He-rich event solar sources

Peak distribution is much further west. SDO resolution?

Why do we detect those events that are not necessarily well connected?
Longitudinal extent of the solar energetic particles

Intensity of the particles flux changes with the 1 AU location

All type of particle events are detected over a wide longitudinal range.

- Is it a common characteristic?
- What are the mechanisms that can explain this spatial distribution in the IMF?
Spread of the open coronal magnetic field?

Not spread enough to explain the wide longitudinal range of the $^3$He-rich.

Does it play a role to explain the in-situ measurement?

C. Cohen
What do we learn from the models?
Magnetic topology of the corona

Pseudo-streamer topology: Coupling closed and open field

- Particles acceleration at null-point and separators
- Injection of particles along open field

Q-factor: trace magnetic field connectivity (topology)

Photospheric prints of the Q-factor are co-spatial with the flare-ribbons (AIA)

Can we use the large scale topology to determine where particles are accelerated and injected along the open field?
Effect of the particle transport - I

Perpendicular transport into the IMF (Fokker-Plank equation)  M. Zhang

Variation of the size of the injection source

Diverging open field lines in the corona below the source surface (derived from the PFSS) can provide the 45° extension.

How do we get the 45° source size?
Effect of the particle transport - II

- Full-orbit simulations along meandering field lines

Fast access to wider cross-field extent early in the event than we thought.

T. Laitinen
What should/could we do next?

- Multi-wavelength observations can help to constrain the coronal properties of the SEP sources.

- The in-situ measurements can help to constrain what are propagation and acceleration requirements.

- Models of the corona can provide diagnostics on the location of the acceleration and the injection of the particles.

- Models of the interplanetary transport can help to understand the link between the source and the in-situ measurements.

How could we combine all these aspects to advance our understanding of the SEP?

Next year: Should we study a set of events by combining models and observations?