

# J2A: Sun-Solar System Connection Roadmap

## Targeted Outcome to Capabilities to Implementation

*Targeted Outcome: Phase 2- 2015-2025, Safeguarding the Journey*  
**Characterize the near-Sun source region of the space environment**

### **Required Understanding**

Particle acceleration mechanisms in CME shocks and CME/flare current sheets

Relationship between CME evolution and pre-existing solar wind conditions

Recognition of precursors of large CMEs, flares and SEP events responsible for major space weather disturbances

Link between magnetic field and solar wind at all latitudes

Acceleration mechanisms and sources of the fast and slow solar wind

Relationship between magnetic flux emergence & transport and the solar wind

### **Enabling Capabilities & Measurements**

UV Spectroscopic determination of Pre/Post-shock density, speed, compression; ion/electron vel. distributions, charge states, abundances; Alfvén speed, magnetic field, reconnection rates in CME shocks, flares, current sheets

Visible light Coronagraph/Polarimeter for electron density evolution and flow speeds

Near-Sun in situ measurements of charged particle distribution, composition, waves & fields; neutrons, hard X-rays & gamma rays

High latitude observations of fields & particles

On-Disk UV/EUV Spectrographic imaging for flow velocities, energy release signatures; Disk Magnetograph for magnetic field topology and evolution

### **Implementation Phase 2: 2015 - 2025**

SEPP to fully characterize coronal sources of SEPs, CME shocks and current sheets

Solar Probe, Solar Orbiter for in situ sampling of inner heliosphere

Doppler to identify disk signatures of CME, flare, and SEP initiation

SPI or Telemachus To characterize high latitude source regions

Integrated empirical Theory/Modeling Program To guide the evolution of physics based predictive theory