

J2B: Quantify particle acceleration for key regions of exploration

Targeted Outcome: Phase 2- 2015-2025, Opening the Frontier

Required Understanding

Key regions of exploration identified in phase 1

Dominant processes controlling stochastic acceleration

Critical parameters that drive acceleration phenomena across shock boundaries

Interaction of background thermal inter-planetary plasma with CME's and CIR's

Role of parallel DC electric field, Alfvén and low frequency waves in acceleration process

Enabling Capabilities & Measurements

Remote and in situ particle and field observations of the corona and near-Sun acceleration regions

Hybrid computer algorithms focused on shock region models in key regions

In situ and remote high temporal, spectral and spatial resolution observations in connected acceleration regions in near-Earth region

Models addressing the interaction of multiple acceleration mechanisms in key regions

Spatially and temporally resolved observations of shock interface in key regions (Sun-Corona, SW-CME-CIR, CME-Mag, Helio-Interstellar)

Implementation Phase 2: 2015-2025

Great Observatory
Assumes launch of Solar-B, STEREO, MMS, SDO, RBSP, THEMIS, IBEX, Cluster

Enabling LWS missions
Sentinels – to provide high resolution observations of shock interaction regions

Contributing IWS Program
ITSP – to provide impact of impact of IT-M plasma acceleration and penetrating e field

Enabling STP Program
AAMP – mission to quantify the acceleration processes probing the readily available near Earth environment.

Contributing STP Program
MTRAP - mission to explore the solar acceleration region dominated by magnetic pressure

Enabling Flagship mission
Solar Probe – will provide obs of acceleration process near sun

Model/Theory Development - Community wide modeling workshops focusing on model development + Theory Program

Potential Discovery
Mission to observe in situ and quantify interplanetary acceleration processes at shock boundaries

Potential Explorer
Mission to observe and quantify large scale impacts of electric field in a magnetized environment

Other Agencies
US: L1 Monitor, ATST
Foreign: ORBITALS, Ravens, Solar Orbiter