

# F2B: 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

Identify dominant processes controlling stochastic acceleration

Quantify the critical parameters that drive acceleration phenomena across shock boundaries

Quantify the dynamics of magnetic topology and electric fields in key regions

Determine the 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 to quantify 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, ITSP, L1 monitor

Enabling LWS missions  
SEPP - quantify critical parameters for the source regions and the SEP outputs

Contributing IWS Program  
Sentinels – will observe heliospheric acceleration shock regions created by CMEs

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 acceleration processes associated with electric field in a magnetized environment

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