Theme	Topic	Contact
Electron strahl	Evolution of the strahl: scattering, instabilities, role of collisions, role of shocks/discontinuities	Seong-Yeop Jeong (EAS, MSSL)
	Use the electron strahl to study global evolution, connectivity/linking	David Stansby (EAS, MSSL, coordinate with Reading
	characterise core/halo/strahl, global properties, is the strahl sometimes "bump-on-tail"?, start by reproducing Helios results	Joel Abraham (EAS, MSSL)
	Examine suprathermal electrons across solar-wind magnetic field and plasma sub-structures: how is the strahl affected by sub-structure boundaries? How well is the strahl confined to a particular sub-structure? See how this varies with heliocentric distance; to what extent can the influence of the IMF topology and kinetic-scale, in-transit interactions on strahl evolution be separated?	Georgina Graham (ESAC)
Turbulence	radial evolution of turbulence	Raffaella D'Amicis (DPU, INAF)
	Turbulence-driven features in the proton and electron VDF: radial evolution	Luca Sorriso-Valvo (DPU, CNR)
	Radial evolution of turbulence and energy cascade fine details in the inner heliosphere	Luca Sorriso-Valvo (DPU, CNR)
	wavevector anisotropy, onset of turbulence, inertial-range properties of turbulence depending on radial distance	Robert Wicks (EAS, MSSL), coordinate with MAG team
	Magnetic switchbacks: turbulence-driven or turbulence drivers?	Luca Sorriso-Valvo (DPU, CNR)
	Proton and alpha-particle distribution functions in switchbacks	Alexis Rouillard and Benoit Lavraud (PAS, IRAP)
	do switchbacks come from interchange reconnection, shear flows of jets, frequency filtering?; what is the actual signature of interchange reconnection?; modelling component	Daniel Verscharen (EAS, MSSL)
	Comparison between observations and kinetic simulations: role of coherent structures in the kinetic-scale turbulent cascade	Francesco Valentini (DPU, Calabria)
	fluctuations in particle moments, wave-like behaviour, large-scale and small-scale properties	New PDRA at MSSL

Reconnection	signatures of reconnection in ion and electron VDFs	Raffaella D'Amicis (DPU, INAF)
	linking in-situ plasma density features to low corona reconnection events	Raffaella D'Amicis (DPU, INAF)
	link between fluid and kinetic scales in magnetic reconnection	Raffaella D'Amicis (DPU, INAF)
	particle acceleration in turbulent reconnection events	Raffaella D'Amicis (DPU, INAF)
	study reconnection signatures in the free solar wind, connection to turbulence studies, comparison with simulations	Jeffersson Agudelo (EAS, MSSL)
	The role of magnetic reconnection at kinetic ion-scales in solar-wind turbulence	S. Toledo-Redondo (PAS)
	Radial evolution of magnetic reconnection properties at proton-kinetic scales and associated turbulence and plasma heating	Benoit Lavraud (PAS, IRAP)
Shocks and ICMEs	CME-driven shocks and particle acceleration	Silvia Perri (DPU, Calabria)
	close-up look at shocks based on trigger-mode case study/studies	Chris Owen (MSSL)
	Structure and properties of interplanetary shocks	A. Rouillard (PAS, IRAP) and I.
	Shocks and other discontinuity properties and structure evolution along their propagation from the Sun to Earth	Andrei Fedorov (PAS, IRAP)
	Relation between plasma, magnetic field, and composition within interplanetary CMEs	A. Rouillard and B. Lavraud
	Kinetic properties of O6+ (and some other major heavies) in shocks	Jim Raines (HIS, Michigan)
	Efficiency of CME shocks in the acceleration of energetic protons and electrons	I. Plotnikov (PAS)
	Combining HIS data of ion composition at thermal energies with EPD/SIS data of suprathermal and energetic ion compositions to study the acceleration in CIR- and CME-related shocks close to the Sun	Nils Janitzek (ESAC)
	Acceleration processes of Helium pickup ions at interplanetary shocks, requires the time evolution of pitch-angle distributions of these Helium ions; radial evolution of Helium pickup ions from interplanetary shocks, acceleration/diffusion processes of Helum pickup ions in the inner heliosphere	Stefano Livi (HIS, SWRI)

Sources and expansion	Generation of the solar wind: variation of electron temperatures depending on source regions, combination with remote-sensing assets, parition of energy between ions and electrons	David Stansby (EAS, MSSL)
	origin of the Alfvénic wind	Raffaella D'Amicis (DPU, INAF)
	Expansion effects on the electron VDF: how important is the "radial direction" for electrons?, statistical study of electron properties depending on theta_vB	Robert Wicks (EAS, MSSL)
	Radial profiles of distribution functions: spatial dependence of energy deposition into ions and electrons based on measurements of the VDFs at different distances	Joel Abraham (EAS, MSSL)
	Polytropic effects in expanding plasma: protons and electrons, determine polytropic index, exchange and coupling	George Nicolaou (EAS, MSSL)
	Machine-learning to determine soure regions: Use HIS composition data in conjunction with other SO instrument data and data from other spacecraft, to apply K-means clustering analysis to quantify various types of solar wind	Michael Collier and Tim Stubbs (HIS)
	High-resolution solar-wind composition (alpha particles and heavy ions): origin of fast and slow winds, and switchbacks	Alexis Rouillard and Benoit Lavraud (PAS, IRAP)
	Testing ionisation and recombination models of the solar wind: Do previously derived models of solar-wind evolution produce charge-state distributions as those measured in the inner heliosphere (O7/O6 and C6/C4 ratios)? Do the ionisation codes capture the main processes governing the plasma's radial evolution or is there missing physics? How valid are our assumptions of Maxwellian electron distributions and ionisation equilibrium at larger distances from the Sun?	Stefano Livi (HIS, SWRI)
	Multi-spacecraft analysis of magnetic-cloud erosion by magnetic reconnection during propagation	Benoit Lavraud (PAS, IRAP)
	Multi-spacecraft analysis of streamer blobs and flux ropes near the Sun	N. Fargette and B. Lavraud

	Structures in the solar wind in the inner heliosphere (more details needed)	Sue Lepri (HIS, Michigan)
	Study of the connectivity of Solar Orbiter and MHD modelling of in-situ data	Victor Réville (PAS)
	In-situ measurements of CIR (or SIR; solar-wind stream interaction regions of the recurring CIR) to investigate the evolution and formation in their eary stage at < 1au	R. Kieokaew (PAS)
Instabilities	Comparison between observations and kinetic simulations: anisotropic heating and generation of various instabilities	Francesco Valentini (DPU, Calabria)
	ALPS studies of marginal stability in ions and electrons	Daniel Verscharen (EAS, MSSL)
Plasma heating	measurements of fields and particle velocity distributions, in synergy with multidimensional kinetic simulations to identify physical processes responsible for heating and dissipation in weakly collisional systems; signatures of (resonant and non-resonant) wave-particle interactions and role in the heating partition among species within different plasma regimes/conditions; emphasis also on Landau Damping at electronic scales	Francesco Valentini (DPU, Calabria)
	use burst-mode interval, combine with PAS to study dissipation-range processes	Robert Wicks (EAS, MSSL)
	Temperature anisotropies in the quiet solar wind: coronal heating and turbulence	Alexis Rouillard (PAS, IRAP)
	Proton-scale waves: energy transport and conversion by EMIC waves in the solar wind	S. Toledo-Redondo (PAS)
	Comparison between observations and kinetic simulations: features in the velocity distribution functions indicating velocity space turbulent cascade	Francesco Valentini (DPU, Calabria)
	Use burst-mode data: high time resolution pitch-angle distributions, operational: one long burst-mode interval?, deomstrate capability	Chris Owen (MSSL)

Structure and shape of VDFs	The 3D fine structures of the distribution functions of the solar wind protons, and the variability of the distribution functions of solar wind protons at sub-second timescales	Philippe Louarn (PAS)
	transition from thermal to suprathermal particles as results of particle acceleration	Silvia Perri (DPU, Calabria)
	Use machine-learning to recognise VDF features in proton and electron VDFs, extract "interesting" distribution functions	Rossana DaMarco (DPU, INAF)
	Radial evolution of the gradient of electron VDFs at low energies: Apply the same technique as currently using on Cluster PEACE to study whether the distribution functions in the core-like energy range can be well-described using a kappa function instead of a Maxwellian; see how this varies with heliocentric distance	Andrew Walsh (ESAC)
	A catalogue of Solar Orbiter suprathermal electron observations: Characterise suprathermal electrons via fitting of spherical harmonics to 3D and pitch-angle distributions; provide a useful resource for future studies	Georgina Graham (ESAC)
Energetic particles	Longitudinal and latitudinal spread of SEP events	I. Plotnikov (PAS)
	Shocks in the solar atmosphere and their role as accelerators of SEPs	A. Kouloumvakos
	Heavy-ion thermalisation: The relationship of heavy-ion temperatures with other species in the solar wind, especially including variation with radial distance and collisional age	Jim Raines (HIS, Michigan)
	(suggested as first paper) Distribution functions of heavy ions in the solar wind: Heavy ions are controlled by Coulomb collisions with protons, as to establish the same thermal velocity, and by interaction with plasma waves, generated and fed by the proton distribution. Resonance will depend on mass/charge and is different for different ions. Measurement of differential speeds and temperature ratios	Stefano Livi (HIS, SWRI)
	Non-thermal signatures in heavy-ion distributions: Minor ions with Z>2, comparisons between velocities, kinetic temperatures, temperature anisotropies, differential streaming	Nils Janitzek (ESAC)

Heavy-ion processes	(flagged as potential Nature-level publication) Multi-dimensional ion distributions to study temperature anisotropy in slow and fast wind: Comparing temperature anisotropy between ions; do they support the mass-per-charge dependency found in remote observations from UVCS and SUMER in streamers and coronal holes? Do we observe temperature anisotropies that are charge-per-mass dependent? Are there ion beams? How does this change in fast and slow wind? Gives important information on acceleration and release mechanisms at Sun.	Stefano Livi (HIS, SWRI)
	Compositional studies of stuctures observed by PSP/WISPR or related to switchbacks: In coordination with MAG, what compositional studies do these structures possess, and can HIS measurements determine where these structures come from? How large are these structures, and can we observe a transition of photospheric-to-coronal compositional values, suggesting a combination of open and closed origin? Especially useful during co-rotation periods.	Stefano Livi (HIS, SWRI)
	He+ values at different latitudes: Determine He+1 densities in the inner heliosphere throughout the mission to determine if He+/He++ values decrease as Solo climbs higher out of the ecliptic. If solar He+ is present, how is it formed (charge exchange with neutrals from dust and interstellar material)?	Stefano Livi (HIS, SWRI)
	near-Sun suprathermal He+ 3D distribution and pitch-angle scattering close to injection	Silvia Perri (DPU, Calabria)
	Inner source of pick-up ions	Stefano Livi (HIS, SWRI)
Comet studies	heliospheric environment via observations of comets based on EUI, METIS, SoloHi and SWA	Raffaella D'Amicis (DPU, INAF)
	End of May/first week of June 2020, Solo will cross a comet tail. Depending on its activity, this will allow for detailed kinetic studies of the comet tail's particles.	Geraint Jones (MSSL)