The Arbitrary Linear Plasma Solver (ALPS): A New Tool for Kinetic Physics with Solar Orbiter and Parker Solar Probe

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The Arbitrary Linear Plasma Solver (ALPS) is a parallelised numerical code that solves the dispersion relation in a hot (even relativistic) magnetised plasma with an arbitrary number of particle species with arbitrary gyrotropic equilibrium distribution functions for any direction of wave propagation with respect to the background field. In this way, ALPS retains generality and overcomes the shortcomings of previous (bi-)Maxwellian solvers for the plasma dispersion relations.

The unprecedented high-resolution particle and field data products from Parker Solar Probe (PSP) and Solar Orbiter (SO) will require novel theoretical tools. ALPS is one such tool, and its use will make possible new investigations into the role of non-Maxwellian distributions in the near-Sun solar wind. It can be applied to numerous high-velocity-resolution systems, ranging from current space missions to numerical simulations. We will briefly discuss the ALPS algorithm and demonstrate its functionality based on previous solar-wind measurements. We will then highlight our plans for future applications of ALPS to PSP and SO observations.