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Analytic heliospheric magnetic field modeling

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Studying the propagation of charged cosmic rays requires a realistic prescription of the background magnetic field of the traversed environment, such as the Galaxy or the heliosphere. In the latter case, analytic models may provide a less accurate, yet simpler and more accessible alternative to computationally expensive high-resolution magnetofluid simulations. In this talk, I will present and review the physical basis, method, and properties of our analytic model for the interstellar magnetic field draping around the heliosphere, including a comparison and performance evaluation with respect to a fully self-consistent simulation.

Together with the Rankine half-body flow, the field forms an exact solution to the induction equation of ideal MHD, and maintains this property even after transformations such as flattening and bulging of the heliotail have been imposed. While the model presently only covers the interstellar magnetic field exterior to the heliopause, its extension to the inside part is possible, and will also be tentatively discussed.

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