

SPD Thomas Metcalf Travel Award Report

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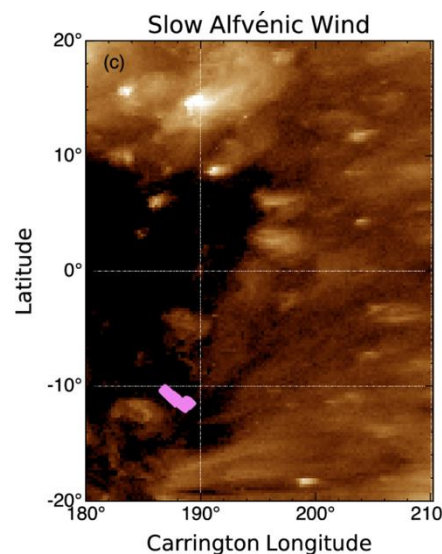


Tamar Ervin is a Ph.D. candidate in the Department of Physics at the University of California, Berkeley. She is conducting her doctoral research under the supervision of Professor Stuart Bale, in collaboration with the Parker Solar Probe science team. Her work focuses on using modeling techniques to link the dynamics of the global coronal magnetic field to in-situ solar wind observations, and applying novel methods to constrain the heating mechanisms that shape the solar wind's evolution.

Characteristics and Sources of the Slow Alfvénic Wind

T. Ervin, K. Jaffarove, S. T. Badman, J. Huang, Y. J. Rivera, P. Riley, R. Dewey, S. D. Bale

Using near-Sun observations from PSP we identify a variety of slow Alfvénic solar wind (SASW) and FSW streams. We connect streams to their solar sources through a combination of modeling methods, identifying a primary SASW population emerging from small over-expanded coronal holes (CHs), while a second population seems to emerge from non-typical CH structures potentially through interchange reconnection with nearby open field lines. The statistical approach we take here reveals robust trends in source region properties and in situ characteristics of both populations. We quantify the error on modeling results and discuss how additional multi-point observations and spectroscopic measurements would allow us to better constrain our models and connect the solar wind to its source.



An example MHD modeling result connecting the slow Alfvénic wind to its source.

Empirical Measurement of Diffusive Heating in the Solar Wind

T. Ervin, A. Mallet, T. A. Bowen, P. Isenberg, K. G. Klein, S. D. Bale

A main goal of Parker Solar Probe (PSP) is to characterize the heating and acceleration mechanisms within the Sun's corona and solar wind. We use observed velocity distribution functions to estimate diffusion coefficients and proton heating rates by inverting the proton guiding center equation across a radial scan observed by PSP. Our approach allows for an empirical estimate from observations of collisionless heating rates in the solar wind within a kinetic framework and discussion of the mechanism(s) at work.

I am deeply grateful to the AAS/SPD Metcalf Committee and the IAUS SOC for this award, as well as to the IAU for the Travel Grant that supported my attendance. Attending this meeting provided invaluable opportunities for scientific discussion and led to an invitation to return to Medellín for a semester to collaborate with students there. These connections would not have been possible without this support.

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