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The expectation that the Alfven critical point or surface is actually a transition region or “Alfven critical zone” has been discussed for several decades (see e.g., [1]), motivated by both observational and theoretical considerations [2,3,4] that suggest enhanced levels, and even a sharp maximum, of turbulence in this region. An irregular surface or extended Alfven zone may be highly dynamic and even fractal in nature [5], giving rise to a variety of physical effects. Some possibilities include: (1) stagnation of inward-type fluctuations producing enhanced interaction between counterpropagating fluctuations; (2) increased regional plasma heating; (3) increased regional scattering and possible energization of solar energetic particles; and (4) intermittent regional occurrence of the earliest stages of shear driven mixing layer dynamics that may explain onset “switchbacks” [6]. Parker Solar Probe is providing a progressively refined perspective (e.g., [7]) on these issues based on in situ observations, which we will review briefly here. Recent observations of behavior of density fluctuations near progressively closer perihelia are particularly relevant to PUNCH. This research partially supported by the PUNCH project under SWRI subcontract N99054DS and by Thailand Science Research and Innovation grant RTA6280002.

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