Abstract Submitted
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On the Thermodynamics and other Constitutive Properties of a Class of Strongly Magnetized Matter Observed In Astrophysics DANIEL BERDICHEVSKY, NASA/GSFC — It is shown that the occurrence of magnetic field work is a consistent thermodynamic explanation of the property of anti-correlation between temperature and density of the electrons gas in a class of magnetic field dominated structures observed in the interplanetary medium. In this model, a 7 to 4 scaling ratio for magnetic-work to electron-gas-work explains the observed anomalous polytropic exponent $\gamma = 1/2$.[1] This interpretation is built on the theoretical conjecture of a matter-state having spatial-confinement of most hadronic-elements of *matter,* i.e., matter held in place by the action of what is here denominated "*super-strong*" magnetic field, which together with the plasma it contains satisfies ideal magnetohydrodynamics.[2] We further show that, within the resolution and sensitivity of the instrumentation used, that the assumptions made in this model are consistent with the coherence observed in changes of magnetic field and electron distribution moments for a case study, the flux-rope (FR) structure passing Earth on June 2, 1998. Here, the intervals of coherence extend in a range of 12 to 30 s for plasma data with a resolution of 3s. Further, the diamagnetic nature of this superconductive state of matter is confirmed for a case study, and an estimate of its permeability and permittivity consistent with space plasma observations made.

[1]Sittler, E.C. Jr., L.F., Burlaga: *J. Geophys. Res.,103,* 17447–17454 1998
[2]Berdichevky, D. B., et al., *Phys. Rev.,* **E67**, doi:10.1103/PhysRevE.036405, 2003.

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