Macro-Scale Fast Flow and Magnetic Field Generation in 2-Temperature Relativistic Gas of Astrophysical Objects

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From an analysis of a relativistic two-temperature electron–ion plasma (a bulk degenerate e–i fluid with a small fraction of relativistically hot e–i astrophysical flow) [1] the simultaneous generation of macro-scale fast flows and strong magnetic fields in the 2-temperature relativistic gas of astrophysical objects due to Reverse Dynamo/Dynamo mechanism is shown. The resulting dynamical magnetic field amplification and/or flow acceleration is directly proportional to the initial turbulent kinetic/magnetic (magnetic) energy; the process very sensitive to relativistically hot electron-ion fraction temperature and magneto-fluid coupling. It is shown that for realistic physical parameters of White Dwarfs accreting hot astrophysical flow / Binary systems there always exists such a real solution of dispersion relation for which the formation of dispersive strong super-Alfvénic macro-scale flows/outflow with Alfvén Mach number $>10^6$ and/or generation of super-strong magnetic fields is guaranteed. Suggested mechanism - an intrinsic tendency of flow acceleration/magnetic field amplification due to magnetofluid coupling in multitemperature, multicomponent systems through the Unified Reverse Dynamo/Dynamo mechanism - represents one possible root to understand the evolution of accreting astrophysical objects/binaries of different nature.

References

[1] K. Kotorashvili and **N. L. Shatashvili**, Astrophysics and Space Science. 367 (1), (2022) 1. **DOI:** 10.1007/s10509-021-04034-1