Abstract Submitted
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On pair plasma instability due to pressure gradients in homogeneous magnetic fields[1] M.J. PUESCHEL, University of Wisconsin-Madison, Madison, Wisconsin 53706, USA; University of Texas at Austin, Austin, Texas 78712, USA, P.W. TERRY, University of Wisconsin-Madison, Madison, Wisconsin 53706, USA, B. TYBURSKA-PUESCHEL, University of Wisconsin-Madison, Madison, Wisconsin 53706, USA; German Aerospace Center, 51147 Cologne, Germany — With the advent of laboratory experiments on collective effects in electron-positron plasmas, theoretical prediction of their stability properties becomes increasingly relevant. Prior work without compressional magnetic fluctuations [Helander & Connor, JPP 82, 905820301 (2016)] predicted complete stability of pair plasmas to density or temperature gradients in a homogeneous magnetic guide field. Here, it is shown that the inclusion of such fluctuations produces a Gradient-driven Drift Coupling (GDC) instability [Pueschel et al., PoP 22, 062105 (2015)] also seen in helium plasma experiments [Pueschel et al., PPCF 59, 024006 (2017)]. An analytical growth rate expression applicable to a wide range of plasma parameters is derived, and a subdominant, finite-k_z GDC is discussed. Overall, the GDC is shown to have a potential impact on systems ranging from Gamma Ray Bursts to magnetic confinement experiments like APEX, to laser-based setups. In all of these configurations, GDC growth times are much shorter than plasma lifetimes.

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