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Mass Dependence in the Turbulent Critical Energy using BCS Theory[1] J.A. JOHNSON III, E.D. MEZONLIN, S.D. ROBERSON, Center for Plasma Science and Technology, Florida A&M University, Tallahassee, FL — The existence of a lambda-like behavior in turbulent transport coefficients suggests that there may be a second order (continuous) phase transition as systems evolve from a non-turbulent to a turbulent state. There are quantitative implications from the use of the Ginzburg-Landau (GL) approach for this phase change. When the BCS theory is applied using the G-L equations to turbulence, the value of the critical turbulent energy, $U_{c,}$is derived directly from the force constraint (and intermolecular constants), the role of the electron can be replaced by the constituent atoms (or molecules) and the free energy per unit volume is proportional to m, the mass of the constituent atoms (or molecules). This gives a turbulent 'isotope' effect from a derivation of the isotope effect in superconductivity.

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