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A Geometric Theory of Fluctuations in Superfluid Hydrodynamics AYDIN KESER, VICTOR GALITSKI, Univ of Maryland-College Park — We derive the "geometric theory of fluctuations," named after the analogy between general relativity and the hydrodynamic equations of superfluid flow, to compute the fluctuations in a superfluid and dissipation due to excitations. In this analogy, the superfluid component gives rise to a curved space-time whereas the normal component (excitations) plays the role of a matter field. We write a Langevin-type stochastic equation for the two fluid system and find the noise and dissipation in terms of the correlators of the covariant stress-energy operator. We examine the structure of fluctuations and dissipation in the stationary equilibrium (Minkowski) background and discuss possible implications of our findings for the hydrodynamic limit of condensed matter systems.

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