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Two-Fluid Theory for Spin Superfluidity in Magnetic Insulators BENEDETTA FLEBUS, Univ of Utrecht, SCOTT BENDER, YAROSLAV TSERKOVNYAK, UCLA, REMBERT DUINE, Univ of Utrecht, UU TEAM, UCLA TEAM — We investigate coupled spin and heat transport in easy-plane magnetic insulators. These materials display a continuous phase transition between normal and condensate states that is controlled by an external magnetic field. Using hydrodynamic equations supplemented by Gross-Pitaevski phenomenology and magnetoelectric circuit theory, we derive a two-fluid model to describe the dynamics of thermal and condensed magnons, and the appropriate boundary conditions in a hybrid normal-metal—magnetic-insulator—normal-metal heterostructure. We discuss how the emergent spin superfluidity can be experimentally probed via a spin Seebeck effect measurement.

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