

Phun with Phase Transitions of the Quantum Mechanical Kind

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Mesoscopic-size Type I superconductors exhibit a first order phase transition in H-T space. For specimens undergoing an isothermal phase transition, the latent heat is supplied/absorbed by a bath. In contradistinction, for specimens undergoing an adiabatic phase transition, the latent heat is supplied/absorbed by the normal regime, resulting in a surprisingly fun non-isentropic result.

In conversations with the Author, John Bardeen wanted to eliminate all the fun by proposing the appearance of a mysterious magnetic hysteresis prior to phase nucleation.

Truth be told, his attempt to remove the fun only made for a more fun result. [1]

An experiment shows the fun in action. [2]

- [1] Keefe, P.D., The European Physical Journal Special Topics, ISSN:1951-6355, Non-Equilibrium Systems and Foundations of Quantum Physics, a publication of Springer, V. 230, No. 4, 993-1001 (June, 2021); available online, open access, at DOI: <https://doi.org/10.1140/epjs/s1734-021-00099-9>.
- [2] O.S. Lutes and E. Maxwell, "Superconducting transitions in tin whiskers," Phys. Rev., 97, 1718 (1955).