

Abstract Submitted
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Electric-field induced superconducting ball formation: new physics of superconductors or a flawed experiment? R.S.B. GHOSH, J.E. HIRSCH, University of California San Diego — In 1999, Rongjia Tao, P.W. Anderson and coworkers reported the discovery of a surprising new effect in high temperature superconductors (Phys. Rev. Lett. 83, 5575 (1999)): in the presence of a large electric field, millions of superconducting microparticles spontaneously aggregated into balls of macroscopic dimensions. Subsequently, Tao and coworkers reported that the same effect takes place in low temperature conventional superconductors (Physica C 377, 357 (2002)). If true, this effect would be evidence for novel physics of superconductors, not described by BCS theory. However our experimental studies with high temperature superconductors show that (i) ball formation also occurs in the absence of an applied electric field, and (ii) the phenomenon also occurs at temperatures above the superconducting transition temperature. Possible origins of the phenomenon and implications for theories of superconductivity are discussed.

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