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Possible free flux flow phase in single crystals of optimally doped $\mathbf{Ba(Fe_{1-x}Co_x)_2As_2}$[1] A.A. GAPUD, O. GAFAROV, University of South Alabama, D.K. CHRISTEN, Oak Ridge National Laboratory, J.R. THOMPSON, University of Tennesse and Oak Ridge National Laboratory — The possibility of a new magnetic component to the superconductivity in the recently discovered iron-containing superconductors – something previously deemed impossible – has attracted a wide breadth of studies. One area of interest is in magnetic phase transitions in the mixed-state "flux medium" comprised of interacting magnetic flux quanta (or vortices) which are found in Type II superconductors. Not surprisingly, the flux dynamics in these materials already show novelties not yet completely understood. Recent work from various groups do agree on a vortex "liquid" phase at highest fields and temperatures, with a "melting" transition line from a phase in which interactions between vortices become significant – all while still affected by pinning mechanisms. To test the proposed phases, the present study explores the possibility of achieving the highly ordered free flux flow (FFF) phase in optimally doped $Ba(Fe_{1-0.92}Co_{0.08})_2As_2$. This may well be the first time such a measurement is reported for iron arsenides, which are also known for strong pinning. Results and preliminary analyses are discussed.

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