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Superconducting phase diagram and fluctuations in $SmFeAsO_{0.85}F_{0.15}$ single crystals U. WELP, C. CHAPARRO, W.-K. KWOK, Argonne National Laboratory, A. RYDH, University of Stockholm, Sweden, N.D. ZHIGADLO, J. KARPINSKI, ETH Zuerich, Switzerland, S. WEYENETH, University of Zuerich, Switzerland — We use micro-calorimetry to investigate the anisotropic phase diagram and effects of superconducting fluctuations in sub-micro-gram single crystals of $SmFeAsO_{0.85}F_{0.15}$. Our measurements reveal that $SmFeAsO_{0.85}F_{0.15}$ is characterized by a large anisotropy of $\Gamma \sim 8$ and a short in-plane Ginzburg-Landau coherence length of $\xi_{ab}(0) \sim 1.3$ nm. These materials parameters promote strong superconducting fluctuations which are seen in the zero-field specific heat as clear upwards curvature in C/T at temperatures below $T_c = 49.5$ K and long tails above $T_{c,}$. The resulting anomaly is cusp-shaped with height of $\Delta C/T_c = 24$ mJ/moleK^2, which can be fitted with 3D-Gaussian fluctuations. The transition shows pronounced broadening in magnetic fields applied along the c-axis. The field evolution in fields higher than 3 T is well described in the frame of 3D lowest-Landau-level scaling of fluctuations using an upper critical field slope of -4.4 T/K. We will compare these characteristics to the behavior of other members of the FeAs-family. This work was supported by DOE-BES under Contract No. DE-AC02-06CH11357.

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