Title:	Anisotropic superconductivity in ZrB 12 near the critical Bogomolnyi point
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Abstract:	The superconductors with the Ginzburg-Landau (G-L) parameter (κ) ~ 1 / √ 2 exist near a critical Bogomolnyi (B) point where they show intertype domains between type-I and type-II superconductivity. While such physics is well understood for isotropic superconductors, the experimental investigation of the physics of anisotropic superconductors near a critical B point remains an unattained goal, mainly due to the unavailability of model material systems. Theoretically, such superconductors are expected to show type-I or type-II behavior for definite directions of an applied magnetic field. Here, from directional point-contact Andreev reflection spectroscopy and field-angle-dependent ac magnetic susceptibility measurements, we show that ZrB 12 is an anisotropic superconductor and it exhibits field-direction-dependent type-I and type-II behavior. These observations match remarkably well with the theoretical expectations for an anisotropic superconductor near a critical B point. Therefore our results project ZrB 12 as a model material system where the physics of intertype anisotropic superconductivity can be explored experimentally.
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