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**Logarithmic flux flow resistivity across the cuprate phase diagram** DAVID BROUN, XIAOQING ZHOU, Simon Fraser University, BEN MORGAN, University of Cambridge, WENDELL HUTTEMA, PATRICK TURNER, Simon Fraser University, JOHN WALDRAM, University of Cambridge, DARREN PEETS, RUIXING LIANG, WALTER HARDY, DOUG BONN, University of British Columbia — The microwave response of vortices in high quality $YBa_2Cu_3O_{6+x}$ and $Tl_2Ba_2CuO_{6+x}$ samples has been studied using high resolution microwave spectroscopy in applied magnetic field. Measurements of the flux flow resistivity and vortex viscosity probe dissipation from electronic states near the vortex cores. These quantities have been accurately measured at temperatures far below $T_c$, at applied fields far below $B_{c2}$, and at a number of dopings that span the entire superconducting region of the cuprate phase diagram. Here we report the first observation of a universal logarithmic temperature dependence of the flux-flow resistivity, in the highest quality samples, across the cuprate phase diagram. The behaviour bears a strong resemblance to the "normal-state" resistivity of the underdoped cuprates first observed by Ando and Boebinger. Our measurements shows that the effect persists to the highly overdoped side, where the resistivity is metallic and the normal state is a Fermi liquid. We show that the resistivity upturns are an intrinsic property of $d$-wave quasiparticles and discuss the implications of this for the nature of the underdoped cuprate normal state.

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