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Depinning transitions of flux lines from extended defects in superconductors ANATOLI POLKOVNIKOV, DAVID NELSON, Harvard University, YARIV KAFRI, The Institut Curie, France — With magnetic force microscopy experiments in mind we study depinning transitions of individual flux lines from extended defects (columnar pins and twin planes) in superconductors. It is shown that the critical exponents characterizing the unbinding transition of a single flux line from a twin plane are very sensitive to the presence of other flux lines in the plane. In particular, the transition becomes discontinuous if the density of these lines becomes large enough. We argue that measuring the properties of the unbinding transition serves as an extremely sensitive probe of the Luttinger liquid parameter, which characterizes the long-distance physics of vortex lines in two dimensions. In addition, we discuss the effects of point disorder on the critical properties of the depinning transition from both a columnar pin and a twin plane.

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