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Vortex in the maze VADIM B. GESHKENBEIN, ETH Zurich, ROLAND WILLA, ETH Zurich, Argonne National Laboratory, GIANNI BLATTER, ETH Zurich — Recent advances in vortex imaging allow for tracing the position of individual vortices with high resolution. By pushing an isolated vortex with a transport current and measuring the linear *ac* response of the vortex, its trajectory and the associated pinning energy has been found in selected regions of the pinning landscape [1]. Analyzing the full two-dimensional problem, we show that the 'broken spring effect reported in [1] finds a natural explanation in terms of a vortex escape in the direction transverse to the applied force. Extending the analysis to include high-frequency response data, we show that the pinning potential can be systematically reconstructed. We introduce the Hessian, the determinant of second derivatives, as a new quantity characterizing a two-dimensional pinning landscape. The regions where vortices can assume an equilibrium position under the action of a homogeneous external force, and hence be observed in vortex imaging, involve positive Hessian. We calculate the area of such stable regions for different types of disorder potentials, that provides information on what part of the landscape can be mapped. [1] L. Embon *et al.*, Sci. Rep. **5**, 7598 (2015).

Roland Willa
ETH Zurich / Argonne National Laboratory

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