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Nonintegral flux penetration in superconductors with broken time-reversal symmetry via bent domain walls DAVID FERGUSON, PAUL GOLDBART, University of Illinois at Urbana-Champaign — Sr_2RuO_4 is a candidate material for realizing a superconducting state that spontaneously breaks time-reversal symmetry [1]. In such a state, the spatial pattern of the superconductivity may be broken up into regions of differing chirality, separated by domain walls. Here, we show that, near to bends in such domain walls, nonintegral (and even nonquantized) multiples of the superconducting magnetic flux quantum would penetrate the system [2]. We discuss the implications of this "bend flux" effect for various experimental probes that are sensitive to time-reversal symmetry breaking. For the example of scanned-probe magnetic imaging, the observation of localized-nonquantized flux penetrating a z-axis surface of the sample, could be interpreted in terms of the presence of bent walls between domains of opposing chirality, and hence would be suggestive of time-reversal symmetry-breaking superconductivity. Alternatively, if observations should reveal localized but only *quantized* flux, this would suggest either (i) the absence of domain walls or (ii) their presence, but as a parallel array of straight walls.

[1] C. Kallin and A. J. Berlinsky, J. Phys. Cond. Mat.**21**, 164210 (2009).
[2] D. G. Ferguson and P. M. Goldbart, arXiv:1011.2765v1 (2010).

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