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Topological Phases in Dissipative Quantum Transport MARK RUDNER, Harvard, MICHAEL LEVIN, Maryland, LEONID LEVITOV, MIT — Recently, a new type of topological quantization was discovered in dissipative quantum transport on a one dimensional bipartite lattice with decay [1]. The transition between distinct topological phases is accompanied by a discontinuous change in the expected displacement covered by a particle before it decays. Here we show that this behavior extends to a much wider family of models, and provide a prescription for computing the topological invariant which distinguishes all of the phases which arise in the general case. When the underlying hopping problem without decay possesses time reversal symmetry, we show that the expected displacement, averaged with respect to all initial states, is quantized. The topological nature of this phenomenon, which is unique to systems with decay, places it on a similar footing as other robust topological phenomena such as the quantization of the Hall conductance [2], or of the adiabatically-pumped charge in periodically-driven 1D systems [3]. Correspondingly, here we find that quantization is robust against a range of perturbations and certain types of decoherence. Similarities and differences with the phases of one-dimensional topological insulators will be discussed. [1] M. S. Rudner and L. S. Levitov, Phys. Rev. Lett. 102, 065703 (2009). [2] D. J. Thouless, M. Kohmoto, M. P. Nightingale, and M. den Nijs, Phys. Rev. Lett. 49, 405 (1982). [3] D. J. Thouless, Phys. Rev. B 27, 6083 (1983).

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