Topological invariant for interacting systems at finite temperature[1] MAXIMILIAN KIEFER-EMMANOUILIDIS, RAZMIK UNANYAN, MICHAEL FLEISCHHAUER, University of Kaiserslautern — As shown in [1], the Ensemble Geometric Phase (EGP) based on the many-body polarization is a meaningful topological invariant for finite-temperature states of non-interacting fermions. Here we show that the same applies to interacting systems with topological order in the ground state. The EGP approaches the T=0 many-body Zak phase when going to the thermodynamic limit of infinite system size and its winding is thus a topological invariant. This opens a new approach for the measurement of topological invariants under realistic experimental conditions as well as for identifying topological order in numerical simulations. We verify our predictions with numerical simulations of the extended super-lattice Bose-Hubbard model at quarter filling, which has symmetry-protected topology with fractional charges. *[1] C.E. Bardyn, L. Wawer, A. Altland, M. Fleischhauer, S. Diehl, PRX. 8, 011035 (2018)*

[1]SFB/TR 185

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