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Martin Fraas* (fraas@vt.edu), 524A Edgewood Lane, Blacksburg, VA 24060. *Many Body Index for Quantum Charge Transport.*

We propose an index for gapped quantum lattice systems that conserve a $U(1)$ -charge. This index takes integer values and it is therefore stable under perturbations. Our formulation is general, but we show that the index reduces to (i) an index of projections in the non-interacting case,(ii) the filling factor for translational invariant systems,(iii) the quantum Hall conductance in the two-dimensional setting without any additional symmetry. Example (ii) recovers the Lieb-Schultz-Mattis theorem,(iii) provides a new and short proof of quantization of Hall conductance in interacting many-body systems. Additionally, we provide a new proof of Bloch's theorem on the vanishing of ground state currents. (Received August 05, 2019)