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Hall Viscosity and Momentum Transport in Lattice and Continuum Models of the Integer Quantum Hall Effect in Strong Magnetic Fields THOMAS TUEGEL, TAYLOR HUGHES, Univ of Illinois - Urbana — Hall viscosity describes non-dissipative transport in systems with broken time-reversal and parity symmetries. We develop a new method for computing the Hall viscosity of lattice systems in strong magnetic fields based on momentum transport, which we compare to the method of momentum polarization used by Tu et al. [Phys. Rev. B 88, 195412 (2013)] and Zaletel et al. [Phys. Rev. Lett. 110, 236801 (2013)] for noninteracting systems. We compare the Hall viscosity of square-lattice tight-binding models in magnetic field to the integer quantum Hall effect (IQHE) showing agreement when the magnetic length is much larger than the lattice constant, but deviation as the magnetic field strength increases. We also relate the Hall viscosity of relativistic electrons in magnetic field (the Dirac IQHE) to the conventional IQHE. The Hall viscosity of a lattice Chern insulator in magnetic field agrees with the Dirac Hall viscosity when the magnetic length is much larger than the lattice constant. We also show that the Hall viscosity of the lattice model deviates further from the continuum model if the C_4 symmetry of the square lattice is broken to C_2, but the deviation is again minimized as the magnetic length increases.

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