

Departmental Colloquium

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2:00p.m., HH3017

Chirality induced Interface Currents in the Chalker Coddington Model

Abstract:

Chalker & Coddington provided in 1988 a simplified description of the quantum dynamics of electrons in a plane, submitted to a background electric potential and a strong perpendicular magnetic field, in a model that now bears their names. The one time step electronic motion is given by a unitary operator on $l^2(\mathbb{Z}^2)$ constructed in terms of scattering matrices attached to the sites of \mathbb{Z}^2 that contain the main physical characteristics of the potential and magnetic fields at these sites. The transport properties of the electrons are then encoded in the spectral properties of the unitary operator, which is our main concern. We consider the situation where the model presents asymptotically pure anti-clockwise rotation on the left and clockwise rotation on the right and we investigate the presence of induced currents at the interface between these two different localised phases. We show the existence of interface currents by proving that the absolutely continuous spectrum of the Chalker Coddington unitary operator covers the whole unit circle. The result is of topological nature and is independent of the details of the model.

This is joint work with J.Asch and O.Bourget