



“Exciton Transport and Perfect Coulomb Drag”

A key attribute of typical quantum Hall systems is that they are topological insulators: They are electrical insulators in the bulk even though perfectly conducting chiral edge states lie at their boundaries. Most quantum Hall effect (QHE) experiments employ a simply-connected Hall bar geometry in which all current and voltage contacts lie at the sample's boundary and are thus connected to these edge states. Such a geometry is sufficient for observing the vanishing longitudinal and quantized Hall resistances which are the hallmarks of the QHE. In contrast, multiply-connected geometries, such as a Corbino annulus with contacts on the inner and outer boundaries, provide clear demonstrations that the bulk of the 2D system is indeed insulating.

In this talk I will discuss how a certain bilayer quantized Hall state modifies this scenario. Specifically, I will report the results of recent experiments in Corbino devices which clearly demonstrate that while the bulk of the bilayer quantized Hall phase at total Landau level filling factor $\nu = 1$ is an electrical insulator just like any other quantized Hall system, it is nonetheless possible to transport energy across it. I will show that this energy transport is enabled by the flow of charge neutral excitons across the bulk, with their emission and absorption at the edges taking place via Andreev reflection. In a closely related ongoing experiment, we have shown that a current flowing in one 2D layer can induce an equal, but oppositely directed, current in the other 2D layer even though there is no electrical connection between them.

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