

Nic Shannon : Short Visit Ref. No. 979

“Fractional excitations on the pyrochlore lattice”

Purpose of the visit

The visit was part of a continuing collaboration with Peter Fulde and Karlo Penc on a model of fractional excitations based on frustrated charge order on a pyrochlore lattice. The long term goal of the project is to obtain an understanding of possible confinement effects arising from quantum fluctuations. The specific goal of this visit was to develop an analytic understanding of gauge transformations which can be used to understand numerical results obtained by Frank Pollmann (student of Peter Fulde).

Description of the work carried out during the visit

The global properties of exact diagonalization spectra of a model of fractional excitations were analyzed in terms of a series of gauge transformations which encode topological symmetries. Topological properties of the manifold of states associated with confined excitations were discussed for models in both 2D and 3D.

Description of the main results obtained

An identity between spectra at the RK point for Bosons and Fermions in 3D was proposed and tested. A set of goals for continuing numerical work on confinement in 3D were identified.

Future collaboration with host institution (if applicable)

Collaboration on this project will continue. An extended visit to Dresden for continuing collaboration is planned for June.

Projected publications/articles resulting or to result from your grant

A paper will be prepared on the connection between topological quantum numbers, charge order and confinement in models of fractional charge in 3D.

Other comments (if any)

Online submission of bank details for repayment is convenient, but should be made via a secure server.