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Symmetry, Graph Reconstruction and Molecular Conduction

Guest Editor:

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Message from the Guest Editor

Algebraic combinatorics and spectral graph theory present the ideal interface between linear algebra and quantum molecular chemistry [10]. Research in basic mathematical theory and its applications offers amazing mutual benefits to both areas. Ulam's reconstruction conjecture (RC), posed in 1942, is still open. O'Neill describes it as a mathematical rarity, as the problem is easily stated [1,2]. Anyone can take a crack at it, but it is certainly not trivial. A graph G (sometimes called a network) is a finite set V of n vertices with a set of edges connecting selected pairs of vertices. A deck D of cards for G is a multi-set of n unlabeled subgraphs G - v on n - 1 vertices, obtained from G by deleting a vertex v, at a time, with its incident edges. Ulam claimed that the parent graph G can be reconstructed from D. Symmetry in a graph plays an important role in its reconstruction, as repeated cards tend to show up in D for graphs with non-trivial automorphism groups. Other important variants of the RC have been proposed, most of which are still open problems [7]. One is polynomial reconstruction (PR). Simply stated...

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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