Algebra/Topology Seminar

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Isomorphism Testing in Groups, Algebras, and Modules

Thursday, March 28, 2019
1:15 p.m. in ES-143

ABSTRACT. The problem of deciding equivalence is fundamental to mathematics, computer science, and other scientific fields. In this talk I will consider, from a computational viewpoint, the equivalence problem for algebraic structures. For instance, is there an efficient algorithm that, given finite groups G and H, decides if G is isomorphic to H? This problem has intimate connections to its more celebrated cousin, the *Graph Isomorphism Problem*, which has enjoyed greater visibility in recent years thanks to the breakthrough result of L. Babai in 2015.

In the talk I will survey methods developed over the last ten or so years in collaborations with several groups of researchers. The overarching theme of this work is the use of fast linear techniques to either solve an isomorphism problem completely, or to reduce it to an easier problem. Central to the approach is the ability to compute effectively with various types of algebras, such as matrix algebras, algebras-with-involution, and Lie algebras. As well as reporting on results we have obtained, I will invite participation by listing some things we would like to know.