Abstract:
In 1980, Fathi showed that the group of compactly supported area-preserving homeomorphisms of the n-ball is a simple group when n \g 3, and asked whether or not this group is simple in the n = 2 case. My talk will be about recent joint work showing that in the n = 2 case, this group is in fact not simple. This answers what is known as the "simplicity conjecture" in the affirmative.

The talk will be aimed for a wide audience, and no particular background will be assumed. In particular, in the first part of the talk, I will explain the relevant terminology --- what is meant by a compactly supported area-preserving homeomorphism, and a simple group --- and I will say a bit about the history of the problem. Then, I will explain the crux of the issue: trying to recover the "Calabi homomorphism", which has a definition involving derivatives, in terms of quantities that make sense even for functions that are not differentiable. These quantities, which are called "spectral invariants", are defined using Floer homology, and I will give a brief non-technical sense of how this works.