

Course Number: PMATH 990 (Topics in Pure Mathematics)

Title: *Multiprover interactive proofs*

Description:  $MIP^*$  is the complexity class of languages with a multiprover interactive proof system, in which the provers are allowed to share entanglement.  $MIP^*$  and the related notion of nonlocal games have been a focus of a lot of research in quantum information over the last decade, culminating in the recent proof that  $MIP^*=RE$  by Ji, Natarajan, Vidick, Wright, and Yuen. This result has had a lot of impact in other areas of mathematics, particularly in operator algebras, where it resolves the Connes embedding problem. In this course, we'll look at the motivation and definition for the class  $MIP^*$ , key ideas such as self-testing and parallel repetition, the proof of  $MIP^*=RE$ , and applications to operator algebras. No prior knowledge about quantum information or operator algebras will be required, but it would probably be good to have some experience in one of these two areas.