Representation Theory, Geometry & Combinatorics Seminar

Organizer: M. Haiman and N. Reshetikhin

Wednesday, 4:00–6:00pm, 939 Evans

Sept. 23 **John Duncan**, Harvard

Rademacher sums, moonshine and black holes

In 1939 Rademacher derived a conditionally convergent series expression for Klein's j-invariant, and used this expression—the first Rademacher sum—to verify its modular invariance. We will explain how to attach Rademacher sums to an arbitrary group commensurable with the modular group, and we will discuss how the automorphy of the resulting functions reflects the geometry of the group in question.

In the case of a group of genus zero the relationship is particularly striking. On the other hand, of all the properties of the groups of isometries of the hyperbolic plane that arise in moonshine, the genus zero property is perhaps the most ellusive. We will show how Rademacher sums can be used to formulate a convenient characterization of the groups of monstrous moonshine.

A physical interpretation of the Rademacher sums comes to light when we consider black holes in the context of three dimensional quantum gravity. This observation amounts to a new connection between moonshine and physics, and promises applications in both directions.