February 8: Ben Brubaker (Stanford University): Building Perfect Multiple Dirichlet Series

Abstract: Multiple Dirichlet series (MDS) are Dirichlet series in several complex variables. The MDS are said to be "perfect" if they possess meromorphic continuation to the entire complex space in which they are defined. Ad hoc examples of perfect MDS were given in the 90's by Bump, Friedberg, and Hoffstein, with important applications to the Birch-Swinnerton-Dyer conjecture, Langlands functoriality and moment conjectures. More recent examples with similar applications have appeared in the last couple of years due to Chinta, Diaconu, and myself. In this talk, I'll briefly mention these examples and their applications. The bulk of the talk will focus on very recent work developing a theoretical framework for these MDS (both results and additional conjectures), producing large classes of new perfect multiple Dirichlet series coming from the harmonic analysis of Eisenstein series associated to certain Lie groups (which we'll review along the way). The description of these Dirichlet series involves combinatorics of Lie algebra representations, such as Young tableaux and Gelfand-Tsetlin patterns, leading to surprising new applications of MDS. The work described is joint with Dan Bump and Sol Friedberg.