

**February 27:** Pavle Pandžić (University of Zagreb and Cornell), “Dirac operators on Harish-Chandra modules.” FOLLOWED BY DINNER. In the 1970s,

Parthasarathy introduced a version of the Dirac operator  $D$  attached to a real reductive group, and used it to construct the discrete series representations. He also obtained a useful necessary condition, Dirac operator inequality, for unitarizability of an irreducible Harish-Chandra module.

In 1997 Vogan studied a purely algebraic version of  $D$  and used it to attach an invariant, called Dirac cohomology, to a Harish-Chandra module  $X$ . He conjectured that Dirac cohomology, if nonzero, determines the infinitesimal character of  $X$ . This conjecture was proved by Huang and myself in 2002. Subsequent generalizations to other settings were obtained by Kostant, Kumar, Alekseev-Meinrenken and Kac-Frajria-Papi. Further results on Dirac cohomology of Harish-Chandra modules included a relationship to  $\mathfrak{n}$  cohomology in some special cases (joint with Huang and Renard).

In this talk I will give a brief overview of the definitions and the above mentioned results. I will then describe some further ideas and open questions. The topics I plan to mention are algebraic Dirac induction,  $\mathfrak{p}^+$  cohomology of unitary highest weight modules, and sharpening the Dirac inequality.