

*Department of Mathematics,  
University of California San Diego*

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# Math 209 - Number Theory

**Lauren C. Ruth**

UC Riverside

## Results and questions on multiplicities of discrete series representations in $L^2(\Gamma \backslash G)$

**Abstract:**

In the pre-talk for graduate students, we will define discrete series representations and give examples for  $SL(2, \mathbb{R})$  and  $GL(2, F)$ , where  $F$  is a local non-archimedean field of characteristic 0 with residue field of order not divisible by 2. In the main talk, first, we will review how the multiplicities of discrete series representations of  $SL(2, \mathbb{R})$  in  $L^2(\Gamma \backslash SL(2, \mathbb{R}))$  are given by dimensions of spaces of holomorphic cusp forms for  $\Gamma$ ; we will take a look at what happens if we try to use the formation of Poincaré series as an intertwiner; and we will summarize some of the methods available for guaranteeing occurrence of discrete series representations in  $L^2(\Gamma \backslash G)$  when  $G$  is a semisimple Lie group other than  $SL(2, \mathbb{R})$ . Second, we will compute the product of the formal dimension of two particular discrete series representations of  $PGL(2, F)$  and the covolume of a torsion-free lattice  $\Gamma$  in  $PGL(2, F)$  by dealing carefully with Haar measure and applying standard facts from  $\mathfrak{p}$ -adic representation theory, thereby giving the first explicit computation of multiplicities of those two discrete series representations in  $L^2(\Gamma \backslash PGL(2, F))$ ; and we will say how the local Jacquet-Langlands correspondence and the work of Corwin, Moy, and Sally could be used to carry out similar calculations. (This material is part of our dissertation on representations of von Neumann algebras coming from lattices in  $SL(2, \mathbb{R})$  and  $PGL(2, F)$ .)

**Special Note:**

Pre-talk begins at 1:20 in 7421

Host: Claus Sorensen

**Thursday, November 16, 2017**

**2:00 PM**

**AP&M 7421**

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