Oberseminar Geometrie	**Wednesday 29th May 2013**
Department of Mathematics	**10:20–12:00**
University of Fribourg	Seminar room, Math. II (Lonza)

Jonathan Pfaff (HCM Universität Bonn)

'Analytic torsion on hyperbolic manifolds of finite volume I'

In my talks I will describe the asymptotic behaviour of the analytic torsion for oriented hyperbolic manifolds of finite volume with respect to certain rays of representations obtained by restriction of irreducible representations of the group of isometries of the hyperbolic space. If the manifolds are not compact, the analytic torsion will be introduced as a regularized analytic torsion. I will also briefly describe some applications to the asymptotic behaviour of the torsion in the cohomology of arithmetic groups as well as some related recent results.

In the first introductory talk I will explain the definition of the analytic torsion associated to flat vector bundles on general closed manifolds. Here the so called zeta-regularized determinant of flat Hodge Laplace operators arises, where a main technical ingredient is the short time asymptotic behaviour of the heat trace of the operators on the diagonal. Then I will recall the famous Cheeger-Müller theorem about the equality of analytic torsion and Reidemeister torsion. In a second step I will specify to hyperbolic manifolds and introduce the heat kernels in this context. One of the key results I will describe is the Harish-Chandra Plancherel theorem for the group of hyperbolic motions.

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'Analytic torsion on hyperbolic manifolds of finite volume II'

In the second talk I will firstly state the main results for compact hyperbolic manifolds and sketch their proof. Then I will pass to the non-compact, finite-volume case. I will start with the definition of the regularized analytic torsion on theses spaces which is modeled after the analytic torsion on closed manifolds. Then I will come to the main results and their proofs. Here some other concepts, in particular the Selberg trace formula and Fourier inversion forumlas for the associated weighted orbital integrals, will arise. Finally, if time permits, I will describe some applications of the main results to arithmetic groups as well as some recent related results.