



# ALGEBRA SEMINAR TALK



WITH

## FARZAD FATHIZADEH & MASOUD KHALKHALI

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The University of Western Ontario

**FRIDAY, OCTOBER 21, 2011**

**3:45 P.M. – Middlesex College Room 107**

### “Curvature in noncommutative geometry II”

In this talk, I will continue the lecture given by Masoud Khalkhali on our recent joint work on the Gauss-Bonnet theorem and scalar curvature for the noncommutative two torus, in the context of Alain Connes' noncommutative differential geometry. I will first construct the Connes-Tretkoff spectral triple encoding the metric information on this  $C^*$ -algebra so that we view it as a noncommutative Riemannian manifold equipped with a general metric. Then I will recall a spectral definition for its scalar curvature, and will illustrate the process of finding a local expression for the curvature by employing a special case of Connes' pseudodifferential calculus for  $C^*$ -dynamical systems by means of which one can pursue the heat kernel scheme of elliptic differential operators and index theory. I should mention that recently Connes and Moscovici also found precisely the same formula independently. At the end I will explain how this formula fits into our earlier work which extends the Gauss-Bonnet theorem of Connes and Tretkoff to general conformal structures on noncommutative two tori.



A. Connes



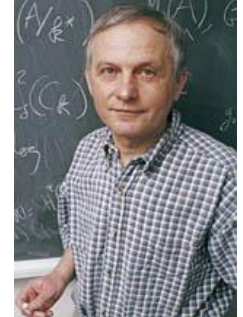
M. Khalkhali



F. Fathizadeh



I. Perlman



H. Moscovici

A few days ago two remarkable papers of A. Connes and H. Moscovici; and also F. Fathizadeh and M. Khalkhali appeared on the ArXiv. They both consider a scalar curvature for noncommutative two tori and they both provide an explicit formula for curvature. The connection between arithmetic, analysis, and ever searching for the “right” analogues of classical notions in noncommutative geometry, is truly fascinating.

In this second talk of Farzad Fathizadeh and Masoud Khalkhali, these two energetic and enthusiastic speakers will explain to us informally more about this very interesting subject. All are most welcome to attend this nice talk! (Please note that this talk will begin at 3:45 p.m.)



**ALL ARE WELCOME! ☺**