

- **Alexandru Buium, University of New Mexico**

Title: The curvature of Spec Z

Abstract: Starting with a symmetric/antisymmetric matrix with integer coefficients (which we view as an analogue of a metric/form on a principal bundle over the "manifold" Spec Z) we introduce arithmetic analogues of connections and curvature (in which usual partial derivative operators acting on functions are replaced by Fermat quotient operators acting on integer numbers). We prove various vanishing (respectively non-vanishing) results for curvature. For instance, we prove that if q defines one of the split classical groups then the curvature of the "Chern" connection on GL_n attached to q does not vanish for n at least 4. On the other hand we show that the above curvature on GL_n always vanishes "to order 3" for all n . Morally, Spec Z is "curved" but only "mildly" curved. This theory can be viewed as taking first steps in developing a "differential geometry" of Spec Z.

- **Matthias Flach, Caltech**

Title: On the local Tamagawa number conjecture for Tate motives

Abstract: The local Tamagawa number conjecture for Tate motives was first proven by Bloch and Kato for unramified local fields in their seminal paper on the (global) Tamagawa number conjecture and has since been reproven by a number of authors (e.g. Perrin-Riou, Benois) in different ways. We report on joint work with Jay Daigle in which we give yet another proof using the Colmez-Cherbonnier reciprocity law which also gives some cases of the conjecture for Tate motives over tamely ramified fields.

- **Marc-Hubert Nicole, Université Aix-Marseille and UCLA**

Title: A "p-adic Kudla" programme: computations in relative rank one.

Abstract: The classical programme of S. Kudla aims at linking derivatives of special values of Eisenstein series with algebraic cycles on Shimura varieties, with the hope of generalizing the Gross-Zagier formula. Very recently, we began articulating a "p-adic Kudla" programme: in a nutshell, replacing Eisenstein series with p-adic families of modular forms i.e., with weights varying p-adically; and replacing the classical derivative with its p-adic variant. We view seminal works from the school of H. Darmon and co., spanning the last 15 years, as evidence for this programme for groups of rank 1. Evidence in higher rank, in which we are especially interested, is scarce: e.g., there are forays using theta liftings from rank 1 groups. In this talk, we shall give an overview our speculative "p-adic Kudla" programme, and present computations on some p-adic groups of relative rank 1 i.e., whose Bruhat-Tits building is a tree.

- **Junecue Suh, U. C. Santa Cruz**

Title: Standard sign conjecture for Shimura varieties

Abstract: Grothendieck's theory of motives is based on the conjectural existence of certain algebraic cycles, among others the Kunneth projectors: This is the standard conjecture of Kunneth type. The standard sign conjecture is a weakening of this, and is strong enough to imply that the homological motives form a Tannakian category. It also provides natural "test" cases for the Hodge and Tate conjectures.

After reviewing the conjecture, its origin and its consequences, we sketch some of the ideas involved in our proof of the sign conjecture in the case of certain Shimura varieties. This is joint work with Sophie Morel.