

Mini-Workshop on Arithmetic

May 7 & 8, 2014

Wednesday, May 7

- **10:30 - 11:30** Tomoyuki ABE (IPMU, JAPAN)

Existence of crystalline companion for curves

In my talk, I'll show the existence of crystalline companion conjectured by Deligne using the theory of arithmetic \mathcal{D} -modules.

- **1:30 - 2:30** Mao SHENG (USTC, CHINA)

Higgs-de Rham flow in positive and mixed characteristic

In this talk, I would like to advertise the notion "Higgs-de Rham flow" both in char p and in mixed char, introduced in the paper "Semistable Higgs bundles, periodic Higgs bundles and representations of algebraic fundamental groups" by Guitang Lan, Kang Zuo and myself. There are two significant applications of this notion so far. One is the construction of representations of étale fundamental groups from semistable Higgs bundles of trivial chern classes over p -adic varieties, obtained in the paper, and the another is a char p proof of Bogomolov-Giesecker's inequality for semistable Higgs bundles and Miyaoka-Yau's chern number inequalities for algebraic surfaces, obtained by Adrian Langer.

- **3:00 - 4:00** Kazuaki MIYATANI (Hiroshima University, JAPAN)

Finiteness of crystalline cohomology of higher level

In my talk, we show the finiteness of crystalline cohomology of higher level under the lack of local freeness of each term of the de Rham complex of higher level. We will also discuss about some difficulties in the logarithmic version.

Thursday, May 8

- **10:30 - 11:30** Ruochuan LIU (BICMR, CHINA)

Relative (φ, Γ) -modules

We will discuss how to generalize the classical theory of (φ, Γ) -modules for Galois representations to a theory of relative (φ, Γ) -modules for local systems over non-archimedean analytic spaces. Joint work with Kedlaya.

- **1:30 - 2:30** Michel GROS (IRMAR, FRANCE)

A splitting of the Azumaya algebra of differential operators and the Simpson correspondence in characteristic $p > 0$

We will explain how, in a local situation, an additional data allows to trivialize quite explicitly some ring of differential operators, leading to a Simpson type correspondence for smooth schemes defined over a perfect field of characteristic $p > 0$ (this is a joint work with B. Le Stum and A. Quiros).

- **3:00 - 4:00** Nobuo TSUZUKI (Tohoku University, JAPAN)

Clemens-Schmid exact sequence in characteristic p

I'll talk on an exact sequence which describes the kernels and the cokernels of monodromy operators on log-crystalline cohomologies of proper semistable families over curves of characteristic p . It is an analogue to Clemens-Schmid exact sequence in Hodge theory. This is a joint work with B. Chiarellotto.