The 8th Takagi Lectures

November 23 (Tue), 2010
Lecture Hall (Room No. 420)
Research Institute for Mathematical Sciences
Kyoto University, Kyoto, Japan

ABSTRACT

Alain Connes: *The BC-system and L-functions*

In these lectures we survey some relations between L-functions and the BC-system, including new results obtained in collaboration with C. Consani. For each prime p and embedding σ of the multiplicative group of an algebraic closure of $\mathbb{F}_p$ as complex roots of unity, we construct a p-adic irreducible representation π_σ of the integral BC-system. This construction is done using the identification of the big Witt ring of $\bar{\mathbb{F}}_p$ and by implementing the Artin–Hasse exponentials. The obtained representations are the p-adic analogues of the complex, extremal KMS_∞ states of the BC-system. We use the theory of p-adic L-functions to determine the partition function. Together with the analogue of the Witt construction in characteristic one, these results provide further evidence towards the construction of an analogue, for the global field of rational numbers, of the curve which provides the geometric support for the arithmetic of function fields.

Sergei Gukov: *Quantization via mirror symmetry*

When combined with mirror symmetry, the A-model approach to quantization leads to a fairly simple and tractable problem. The most interesting part of the problem then becomes finding the mirror of the coisotropic brane. We illustrate how it can be addressed in a number of interesting examples related to representation theory and gauge theory, in which mirror geometry is naturally associated with the Langlands dual group. Hyperholomorphic sheaves and (B, B, B) branes play an important role in the B-model approach to quantization.