

# Lie Groups and Representation Theory Seminar at the University of Tokyo

## リー群論・表現論セミナー

- DATE October 26 (Tue), 2010, 16:30–18:00
- PLACE Room 126, Graduate School of Mathematical Sciences
- SPEAKER **Daniel Sternheimer** (Keio University and Institut de Mathématiques de Bourgogne)
- TITLE Some instances of the reasonable effectiveness (and limitations) of symmetries and deformations in fundamental physics
- ABSTRACT In this talk we survey some applications of group theory and deformation theory (including quantization) in mathematical physics. We start with sketching applications of rotation and discrete groups representations in molecular physics (“dynamical” symmetry breaking in crystals, Racah–Flato–Kibler; chains of groups and symmetry breaking). These methods led to the use of “classification Lie groups” (“internal symmetries”) in particle physics. Their relation with space-time symmetries will be discussed. Symmetries are naturally deformed, which eventually brought to Flato’s deformation philosophy and the realization that quantization can be viewed as a deformation, including the many avatars of deformation quantization (such as quantum groups and quantized spaces). Nonlinear representations of Lie groups can be viewed as deformations (of their linear part), with applications to covariant nonlinear evolution equations. Combining all these suggests an Ansatz based on Anti de Sitter space-time and group, a deformation of the Poincare group of Minkowski space-time, which could eventually be quantized, with possible implications in particle physics and cosmology. Prospects for future developments between mathematics and physics will be indicated.