Kavli IPMU-FMSP Workshop
"Supersymmetry in Physics and Mathematics"

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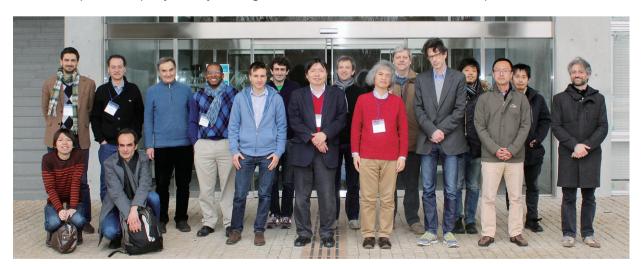**Kavli IPMU Principal Investigator**

Supersymmetry is originally a notion in particle physics describing the symmetry between two basic classes of elementary particles: bosons, which have an integer valued spin; and fermions, which have a half integer valued spin. Supersymmetry is a recurring theme in theoretical physics to find a unified description of the fields and forces of nature. On the other hand, supersymmetry is an interesting structure also from the purely mathematical viewpoint, for example, as a natural and rich generalization of classical algebraic structures such as Lie algebras, or as realizations via special types of spinor fields on Riemannian or pseudo-Riemannian manifolds. The last theme is also intimately connected with classical and quantum field theories on curved spacetime with supersymmetry, which have recently attracted interest among both physicists and mathematicians.

The purpose of the workshop was to promote interaction between physicists and mathematicians in various aspects of supersymmetry. Among participants, there were theoretical physicists and mathematicians of various disciplines including the theory of operator algebras, representation theory and geometry. The workshop took place for 9 days from March 10–20, 2014, at the Kavli IPMU's Lecture Hall. There were in principle three talks per day, and we had a lot of time to discuss among physicists and mathematicians.

Main subjects discussed in the workshop were generalizations of Lie algebras and their representations, non-commutative geometry, cyclic cohomology, supersymmetric generalization of vertex operators, twistor spinors, conformal analogs of Calabi-Yau manifolds, etc.

The organizers of the workshop were Yasuyuki Kawahigashi, Toshitake Kohno, and Stefan Hollands. The workshop was supported by Kavli IPMU and "Frontiers of Mathematical Sciences and Physics" (FMSP), which is a part of the Program of Leading Graduate Schools, MEXT Japan.

Workshop