

【Grant-in-Aid for Scientific Research (S)】

Science and Engineering (Mathematical and Physical Sciences)



Title of Project : New development of algebraic geometry viewed from theoretical physics

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Research Project Number : 16H06335 Researcher Number : 70191062

Research Area : Mathematical and Physical Science, Mathematics, Algebra

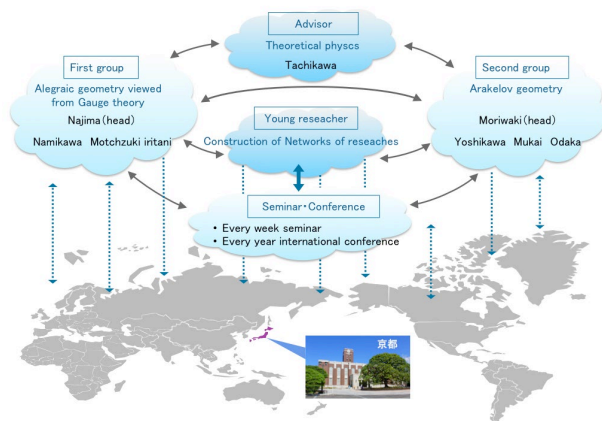
Keyword : Algebraic Geometry

【Purpose and Background of the Research】

As pointed out by Prof. Dodd, algebraic geometry is an experimental field of mathematical theory. Nowadays it is also an experimental field of theoretical science. Especially interactions with supersymmetric gauge theory starting from 80's and the mirror symmetry of Calabi-Yau manifolds inspired by superstring theory during 90's were the most impressive achievements. Beside them, we have a lot of developments of algebraic geometry related to mathematical physics such as the theory of symplectic manifolds, Seiberg-Witten invariant, Gromov-Witten invariant, Donaldson-Thomas invariant and so on.

As above, perspectives from mathematical physics are recently necessary methods to develop algebraic geometry. Moreover, new research subjects of algebraic geometry arise from the borders around mathematical physics.

Fortunately, in Kyoto University, we have a lot of algebraic geometers deeply related to mathematical physics. We coordinate the colleagues as a research team and try to find surprising phenomena and new theories connected with mathematical physics, which lead to recent developments of algebraic geometry and contribute to construct an international center of this area at Kyoto.



【Research Methods】

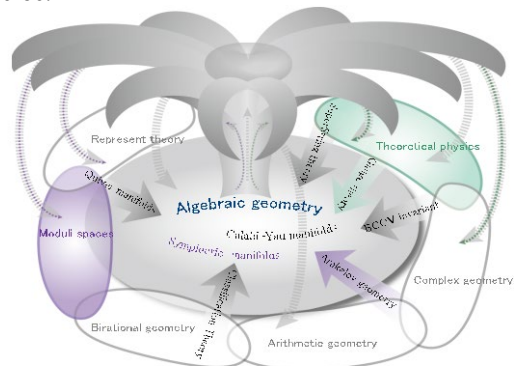
We assign two teams to our Research group. The first team consists of Nakajima, Namikawa, Mochizuki, Iritani, who study algebraic geometry viewed from gauge theory. The second team consists

of Moriwaki, Mukai, Yoshikawa, Odaka, who study arithmetic geometry around mathematical physics. Tachikawa will give advises to two teams as a theoretical physicist.

We employ a young and excellent researcher, who will work in order to join achievements of two teams and construct international networks of our research area.

【Expected Research Achievements and Scientific Significance】

We hope that we will obtain significant results of algebraic geometry relevant to mathematical physics. These fruits will give a big influence on not only algebraic geometry but also theoretical physics.



【Publications Relevant to the Project】

- H. Nakajima, Instantons on ALE spaces, quiver varieties, and Kac-Moody algebras, Duke Math. 76 (1994) 365--416.
- A. Moriwaki, "Arakelov geometry", Translations of Mathematical Monographs, vol 244, (2014), American Mathematical Society.

【Term of Project】 FY2016-2020

【Budget Allocation】 61,700 Thousand Yen

【Homepage Address and Other Contact Information】

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