# Preface

The conference "Algebraic and Arithmetic Structures of Moduli Spaces" was held in September 2007, at Sapporo. Twenty talks were delivered by invited speakers from USA, UK, Germany, Holland, India, Russia and Japan. The subjects of the talks are mainly on algebraic geometry and arithmetic geometry, but also on complex geometry, though many of them were focused more or less on moduli spaces.

The plan to publish this proceedings was made at the very beginning of the preparation of the conference. Although all the speakers of the conference were invited to contribute their articles to this proceedings, many of the speakers were unfortunately unable to do so partly because of lack of time. All the papers submitted by the deadline were sent to the referees and the proceedings here presents eleven papers which have undergone rigorous refereeing. We would like to thank all the referees for their assistance.

The topics that are discussed in the articles are diverse in nature such as class field theory, zeta functions, moduli of arithmetic vector bundles, moduli of complex vector bundles, moduli of abelian varieties and theory of display which relates to arithmetic theory of moduli of abelian varieties, moduli of Fermat varieties and some topics on cubic threefolds. This reflects the atomosphere of the conference pretty well.

The articles of Deninger and Werner, Rajan, Pappas and Rapoport, Weng and Yoshida are more or less around class field theory, Galois representation or Langlands' program. Meanwhile, the Narashimhan and Seshadri correspondence is, for a given compact Riemann surface $R$, the bijective correspondence between irreducible unitary representations of its fundamental group $\pi_1(R)$ and stable vector bundles of degree zero over $R$. Thus stable vector bundles of degree zero will give Galois representations once we admit an analogy between $\pi_1(R)$ and the absolute Galois group $\mathrm{Gal}(\overline{\mathbb{Q}}/\mathbb{Q})$.

If one pursues Galois representations in this direction, it would be natural to generalize Narashimhan and Seshadri correspondence into an arithmetic version of it. This would be the major interest of the article by Deninger and Werner. In their paper, Deninger and Werner define a functorial parallel transport, which gives rise to a representation of the étale fundamental group of an algebraic curve over $\overline{\mathbb{Q}}_p$ on the fiber of a certain semistable vector bundle. This gives almost a converse to an earlier result of Faltings, which says that $p$-adic representations of the fundamental group of a $p$-adic curve give rise to semistable $p$-adic Higgs bundles of slope zero.