Name: Shigeharu TAKAYAMA

Subject: Complex analysis and geometry, algebraic geometry.

Key words: Complex manifold, Kähler manifold, Kodaira vanishing, L^2-estimate, $\overline{\partial}$-equation.

Current research topics:

I study complex algebraic varieties by complex analytic methods. (I do not study complex analysis itself.) More concretely, my research theme is "Complex geometry of the canonical bundle". Especially by studying the so-called adjoint bundle associated to a positive or an ample line bundle, we may obtain deeper structures of varieties by some weaker geometric conditions. Very roughly, the classification of algebraic varieties is done by the sign of the canonical bundle. I am now interested in varieties with semi-positive canonical bundle. In this case, more precise classification will be done by studying pluricanonical bundles. Also for a morphism $f : X \to Y$, I study $f : X \to Y$ through a study of the positivities of the relative canonical bundle $K_{X/Y}$, its power $K_{X/Y}^{\otimes m}$, and that of its direct image $f_*(K_{X/Y}^{\otimes m})$.

Requests for students:

Based on a fundamental knowledge of complex analysis in one variable and the theory of differentiable manifolds, students will be requested to learn about complex analysis in several variables, differential geometry, sheaves and cohomologies, and so on. Basic related references is as follows.

Complex geometry:

Huybrechts: Complex Geometry, Springer.

Wells: Differential analysis on complex manifolds.

Demailly: Complex analytic and algebraic geometry
(http://www-fourier.ujf-grenoble.fr/ demailly/books.html)

Algebraic geometry:

Hartshorne: Algebraic geometry, Springer GTM 52.

Lazarsfeld: Positivity in algebraic geometry I, II, Springer.

Complex analysis in several variables:

Hörmander: Complex analysis in several variables.