



The Hong Kong University of Science and Technology
Department of Mathematics

Hong Kong Geometry Colloquium

I. Periods and quasiperiods of modular forms

by

Prof. Emanuel Scheidegger

Beijing International Center for Mathematical Research

Abstract

Weakly holomorphic forms play an important role in various areas of mathematics, the prominent example being the j -invariant. After reviewing the basic properties of holomorphic modular forms, we discuss the analogous statements for weakly holomorphic modular forms. Then we extend the notion of periods of modular forms to the weakly holomorphic setting where they become quasiperiods. This leads in a natural way to a Hodge structure. Finally, we will look for these Hodge structures in geometry.

Date : Saturday, 26 October 2019

Time : 10:00a.m.-11:00a.m.

**Venue : Room 1410, Academic Building
(Lifts 25-26), HKUST**

II. Geometric properties of Gromov-Witten generating series and quasi-modular forms

by

Prof. Jie Zhou

Yau Mathematical Sciences Center, Tsinghua University

Abstract

The generating series of Gromov-Witten invariants of a Calabi-Yau manifold are a priori defined as a formal series in the Novikov variable. The analytic properties of them (e.g., exhibited by Givental's I-functions at genus zero) tell that these formal series can actually be extended to complex-analytic objects living on a small neighborhood of the so-called large volume limit on the Kahler moduli space. Mirror symmetry predicts that they are algebraic objects such as sections of certain vector bundles over the moduli of complex structure of the mirror Calabi-Yau manifold.

I will describe algebraic/geometric properties of these generating series, using examples such as elliptic curves and quintic threefolds. For the elliptic curve case we shall see that these series are (quasi-)modular forms which are fundamental objects in the study of traditional number theory. The Gromov-Witten generating series of more general Calabi-Yau manifolds can be naturally regarded as generalizations of (quasi-)modular forms.

Date : Saturday, 26 October 2019

Time : 11:25a.m.-12:25p.m.

**Venue : Room 1410, Academic Building
(Lifts 25-26), HKUST**

All are welcome!

Light refreshment will be provided at Room 3493 from 11:00 am to 11:25 am