

**Lecture 1: Unearthing the visions of a master: Harmonic Maass forms**

**Lecture 2: Arithmetic and Maass forms**

**Combined Abstract**

Together with his collaborators, the speaker has been researching the analytic and arithmetic properties of the so-called harmonic weak Maass forms. These nonholomorphic modular forms play central roles in many subjects such as arithmetic geometry, combinatorics, modular forms, and mathematical physics. Here we outline the general facets of the theory, and we give several applications: partitions and  $q$ -series, modular forms, singular moduli, Borcherds products, and the Birch and Swinnerton-Dyer Conjecture. What is surprising is that this story has an unlikely beginning: the pursuit of the solution to a great mathematical mystery.