

THE UNIVERSITY



OF HONG KONG

*Institute of Mathematical Research
Department of Mathematics*

COLLOQUIUM

Supercongruences for rigid hypergeometric Calabi--Yau threefold

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Abstract

We establish the supercongruences for the fourteen rigid hypergeometric Calabi--Yau threefolds over \mathbb{Q} conjectured by Rodriguez-Villegas in 2003. Two different approaches are implemented, and they both successfully apply to all the fourteen supercongruences. Our first method is based on Dwork's theory of p -adic unit roots, and it allows us to establish the supercongruences for ordinary primes. The other method makes use of the theory of hypergeometric motives, in particular, adapts the techniques from the recent work of Beukers, Cohen and Mellit on finite hypergeometric sums over \mathbb{Q} . Essential ingredients in executing the both approaches are the modularity of the underlying Calabi--Yau threefold and a p -adic perturbation method applied to hypergeometric functions. This is a joint project with Fang-Ting Tu, Noriko Yui, and Wadim Zudilin.

Date: June 28, 2017 (Wednesday)

Time: 4:00 - 5:00pm

Venue: Room 210, Run Run Shaw Bldg., HKU

All are welcome