

EDITORIAL



# Modular forms are everywhere: celebration of Don Zagier's 65th birthday

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## Preface

Modular forms are omnipresent in mathematics. These functions play central roles in arithmetic geometry and number theory, and they have recently turned up in the study of black holes and string theory. Their presence usually indicates a deep underlying structure teeming with symmetry. Indeed, to many mathematicians modular forms appear to be everywhere in mathematics.

Don Zagier stands out as one of the giants in mathematics, and he is one of the undisputed world experts in the theory of modular forms. His magical ability to discover deep modular identities is the stuff of legend. His enthusiasm for mathematics, and his generosity has propelled mathematicians and mathematics since he first emerged as a professional in the early 1970s.

To celebrate Don's 65th birthday (a few weeks before his 66th birthday), we organized a summer school and research conference at the Max Planck Institute for Mathematics (MPIM) in Bonn during two lovely weeks in May 2017. These memorable events were enjoyed by his students, collaborators, and leading mathematicians. These activities were funded by generous support from the European Research Council (Principal Investigator: Kathrin Bringmann<sup>1</sup>) and the Max Planck Institute for Mathematics.

The speakers unanimously expressed their enthusiasm for the event and the opportunity to honor the influence that Don has had on them and the field of mathematics. The school attracted approximately 100 participants from all over the world, and the research conference hosted roughly 140 participants, making these activities the two largest week-long events ever held at the MPIM. We would be remiss if we did not acknowledge the superb support of the MPIM staff, in particular the exceptional work of Svenja Beljaars who handled the many participant needs. This overwhelming response and interest vividly demonstrated Don's high standing in the world of mathematics.

The "Summer School," which was held May 15–19, 2017, consisted of the three courses:

- Martin Möller (U. Frankfurt)  
"Partitions, quasimodular forms and counting covers"
- Fernando Rodriguez Villegas (ICTP)  
"Arithmetic of differential equations, with emphasis on the hypergeometric and modular cases"

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- Don Zagier (MPIM)

“Complex multiplication and its applications in the theory of modular forms.”

The international research conference was held May 22–26, 2017, and consisted of invited lectures by Valentin Blomer, Francis Brown, Roelof Bruggeman, Henri Cohen, Atish Dabholkar, Henri Darmon, William Duke, Stavros Garoufalidis, Dorian Goldfeld, Alexander Goncharov, Tomoyoshi Ibukiyama, Özlem Imamoğlu, Masanobu Kaneko, Maxim Kontsevich, John Lewis, Philippe Michel, Martin Möller, Maryna Viazkovska, and Fernando Rodriguez Villegas.

This volume consists of exciting papers, including several contributions by authors who were regrettably unable to attend the research conference. Adding to the mythology that modular forms are everywhere, we are delighted that there are **24** papers, as 24 is a most magical number<sup>2</sup> in the theory of modular forms.

Ken Ono

(On behalf of co-organizers: Kathrin Bringmann, Stephen Ehlen, Michael Griffin, Maxim Kontsevich, Pieter Moree, Martin Raum, Larry Rolin and Michael Woodbury).



Don Zagier in 2014 (credit: B. Seghers)

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<sup>2</sup>For example,  $\Delta(\tau)$  is the 24th power of Dedekind's eta-function, and the Leech lattice is 24 dimensional.