

Colloqui della Classe di Scienze

Anno Accademico 2025/2026

Aula Bianchi
Palazzo della Carovana
Scuola Normale Superiore
Piazza dei Cavalieri, 7 - PISA

8 JULY 2026
h 3.00 p.m.

AVI WIGDERSON

Herbert H. Maass Professor, School of Mathematics,
Institute for Advanced Study, Princeton

THE VALUE OF ERRORS IN PROOFS
(a fascinating journey from Turing's 1936
 $R \neq RE$ to the 2020 breakthrough of $MIP^* = RE$)

ABSTRACT:

In the year 2020, a group of theoretical computer scientists posted a paper on the Arxiv with the strange-looking title "MIP* = RE", impacting and surprising not only complexity theory but also some areas of math and physics. Specifically, it resolved several long-standing problems in these areas. (You can find the paper here: <https://arxiv.org/abs/2001.04383>)

As it happens, both acronyms MIP* and RE represent proof systems, of a very different nature. To explain them, we'll take a meandering journey through the classical and modern definitions of proof. I hope to explain how the methodology of computational complexity theory, especially modeling and classification (both problems and proofs) by algorithmic efficiency, naturally leads to the generation of new such notions and results (and more acronyms, like NP). A special focus will be on notions of proof which allow interaction, randomness, and errors, and their surprising power and magical properties.

