
THE WEIZMANN INSTITUTE OF SCIENCE
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE
Algebraic Geometry and Representation Theory Seminar

Room 1 ,Ziskind Building
on Wednesday, Oct 07, 2015at 11:00

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The Joy of Symbol-Crunching

Abstract:

19th century mathematicians (Gauss, Riemann, Markov, to name a few) spent a lot of their time doing tedious numerical computations. Sometimes they were assisted by (human) computers, but they still did a lot themselves. All this became unnecessary with the advent of computers, who made number-crunching million times faster (and more reliable).

20th- and 21st- century mathematicians spent (and still spend) a lot of their time doing tedious symbolic computations. Thanks to the more recent advent of Computer Algebra Systems (e.g. Maple, Mathematica, and the free system SAGE), much of their labor can be delegated to computers, who, of course, can go much faster, much further, and more reliably.

But humans are still needed! First, to teach the computer how to crunch symbols efficiently, but, just as importantly, to inspire them to formulate general conjectures, and methods of proof, for which humans are (still) crucial. I will mention several examples, most notably, a recent proof, by (the human) Guillaume Chapuy, of a conjecture made with the help of my computer Shalosh B. Ekhad (who rigorously proved many special cases), generalizing, to multi-permutations, Amitai Regev's celebrated asymptotic formula for the number of permutations of length n avoiding an increasing subsequence of length d .