

BERNOULLIS TAFELRUNDE

GRADUATE STUDENT SEMINAR

Thursday, 28 March 2019, 12:15-13:00

Seminarraum 05.002, Spiegelgasse 5

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On (Hilbert, Isabelle) and universal pairs

ABSTRACT

While the original formulation received an answer in 1970, Hilbert's tenth problem still offers many open questions. In my talk, I will present two recent results that stem from projects initiated by Yuri Matiyasevich, who solved Hilbert's tenth problem in 1970. Firstly, we establish a computer-verified proof of the answer of Hilbert's tenth problem in Isabelle/HOL. Theorem provers like Isabelle have the potential to drastically change the way mathematics is made today. Our project exemplifies that the existing systems are mature enough to be used by students without expert support. Hence, it poses the question to mathematicians if formal verification should already be used more in daily research.

Secondly, I will present recent results on the “complexity” of diophantine equations, which are the central subject of Hilbert's tenth problem. For many sets $A \subseteq \mathbb{N}$ one can construct a diophantine equation, i.e. a polynomial equation with integer coefficients whose solution set is A . We investigate what number of variables and degree suffice for such an equation to exist. In particular, the existing results for variables in \mathbb{N} are extended to variables in \mathbb{Z} .