Universität Augsburg
Mathematisch-Naturwissenschaftliche
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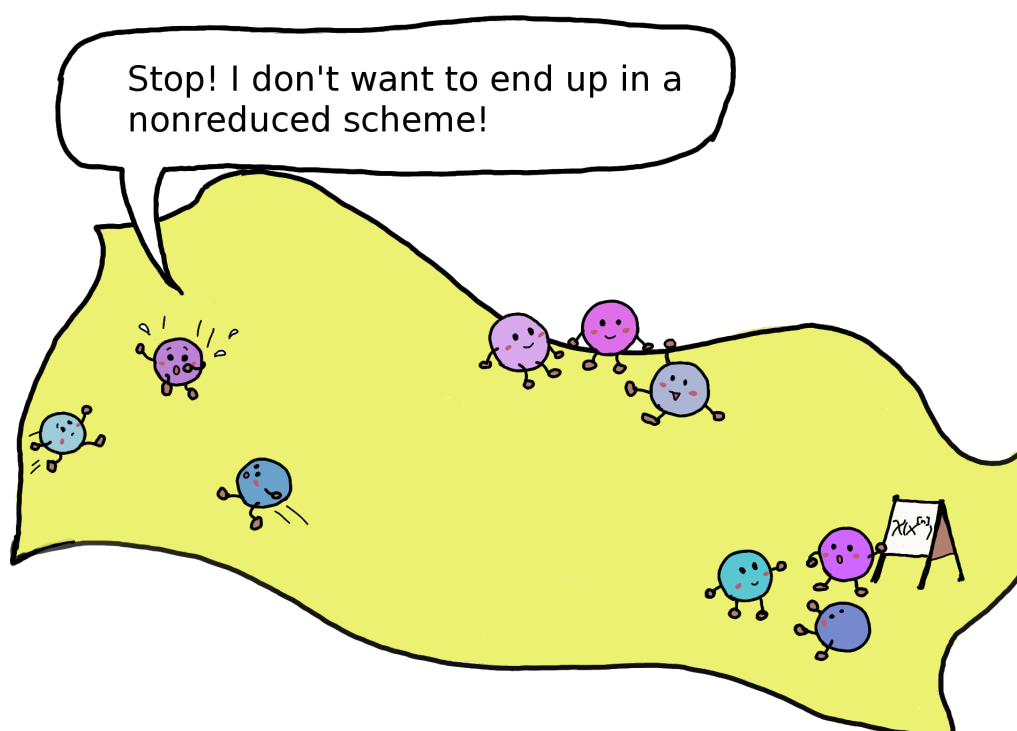Arbeitsseminar Geometrie/Topologie

Ingo Blechschmidt − A one-parsec overview of the Hilbert scheme

Given a geometric object X, the Hilbert scheme $X^{[n]}$ is the fine moduli space of unordered collections of n points in X. If X is a smooth projective surface, the Hilbert scheme is a smooth connected manifold of dimension $2n$, so not at all a scary singular scheme. This is in constrast to the naive set-theoretical quotient $X^n/\mathfrak{S}_n$, which is in general non-singular along the diagonal.

Hilbert schemes exhibit an intriguing geometry and establish a remarkable connection between geometry, algebra, and combinatorics. For instance, they have been used to settle famous conjectures in combinatorics relating Macdonald polynomials and diagonal harmonics.

The talk will give a small and informal glimpse on these topics, requiring only basic familiarity with algebraic topology. On the way, we will meet explicit models with commuting matrices, the calculation of Euler characteristics using fixed point methods, Young diagrams for partitions, and creation and annihilation operators from quantum mechanics.

Date and Place: Monday, 27 April 2015, 12:15 − 13:45 in 2004/L1