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Mathematical Colloquia

Monday, 16 December 2019

17:15 h, Lecture Room 119

Prof. Dr. Oliver Lorscheid, IMPA Brasil / MPI Bonn

The moduli space of matroids

Abstract:

Matroids are combinatorial gadgets that reflect properties of linear algebra in situations where this latter theory is not available. This analogy prescribes that the moduli space of matroids should be a Grassmannian over a suitable base object, which cannot be a field or a ring; in consequence usual algebraic geometry does not provide a suitable framework. In joint work with Matt Baker, we use algebraic geometry over F1, the so-called field with one element, to construct such moduli spaces. As an application, we streamline various results of matroid theory and find simplified proofs of classical theorems, such as the fact that a matroid is regular if and only if it is binary and orientable.

We will dedicate the first half of this talk to an introduction of matroids and their generalizations. Then we will outline how to use F1-geometry to construct the moduli space of matroids. In a last part, we will explain why this theory is useful to simplify classical results in matroid theory.