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UNIVERSITÄT BERN

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Departement Mathematik und Statistik

Mathematisches Institut

Mathematical Colloquia

Monday, 07 November 2022

17:15 h, lecture room B6 (ExWi)

Dr. Gavin St. John, University of Bern

Encoding decision problems in non-classical logics

A central and classic problem in mathematical logic is, for a given logic L: "is the set of all theorems of L decidable?" Phrased differently, is there a decision procedure for determining whether a given formula is a theorem of the logic L? In the case of Classical Propositional Logic, the answer is yes, as the problem of theoremhood for a particular formula reduces to computing a truth table for that formula. Many non-classical logics also have decidable theoremhood, for instance the decidability of Intuitionistic Propositional Logic can be shown using a number of techniques. On the other hand, while seemingly rare for propositional logics, such is not always the case in general; in particular, theroemhood in Relevance Logic is undecidable. In this talk we will consider this problem for a broad class of non-classical logics, namely for what are called Substructural Logics. Using algebraic methods, we will show how to implement decision problems in a large subclass of these logics. In particular, we demonstrate undecidability results by encoding the Halting Problem for a simple variant of Turing Machines known as Counter Machines.