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UNIVERSITÄT BERN

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Departement Mathematik und Statistik

Mathematisches Institut

Mathematical Colloquia

Monday, 28 March 2022

17:15 h, lecture room B6 (ExWi)

Prof. Dr. Nick Galatos, University of Denver

Binary relations on sets and posets

(Joint work with P. Jipsen)

Abstract: Given binary relations on a set we can take their intersection, union, complement, composition and inverse/converse. Clearly union of relations is commutative, but composition (while associative) is not commutative. Tarski asked what equations hold in the algebra of binary relations in terms of the above operations. We will recount some of the work that was done in that direction and also compare it to the same question about equations on groups, Boolean algebras and lattice-ordered groups.

Algebras of relations on a set are useful in computer science applications, since relational composition models successive applications of programs (the dynamic part of relations), while the Boolean operations allow for expressing logical statements (the logical part). This logic is classical and, although useful in math and science, is inadequate for constructive mathematics and parts of computer science. Time permitting, we will show how moving from relations on sets to relations over partially-ordered sets manages to retain the dynamic part while also improving the logical part to its constructive version.