Mathematisches Institut, Sidlerstrasse 5, CH-3012 Bern

UNIVERSITÄT BERN

Philosophisch-naturwissenschaftliche Fakultät

Departement Mathematik und Statistik

Mathematisches Institut

Mathematical Colloquia

Monday, 14 October 2019

17:15 h, Lecture Room 228

Prof. Dr. Constantine Tsinakis, Vanderbilt University

The Interplay of Algebra and Logic: Residuated Lattices and Substructural Logics

Abstract:

Algebraic logic studies classes of algebras that are related to logical systems, as well as the process by which a class of algebras becomes the algebraic counterpart (semantics) of a logical system. This survey talk presents an accessible introduction of the interaction between substructural logics and residuated lattices (their algebraic counterparts).

Substructural logics are non-classical logics that are weaker than classical logic, in the sense that they may lack one or more of the structural rules of contraction, weakening and exchange in their Genzen-style axiomatization. They include many non-classical logics related to computer science (linear logic), linguistics (Lambek Calculus), philosophy (relevant logics), and many-valued reasoning. Residuated lattices first appeared explicitly in the work of Krull, Ward and Dilworth as abstractions of ideal lattices of rings in the early 1930's. Their study, however, goes even further back to Hilbert's foundational studies of geometry, and Riesz's development of the theory of operators and their spaces.

There have been numerous developments in the algebraic theory of residuated lattices during the past two decades which have produced powerful tools for the comparative study of substructural logics. Moreover, the bridge algebraic logic builds provides significant benefits to algebra as well via proof-theoretic techniques.