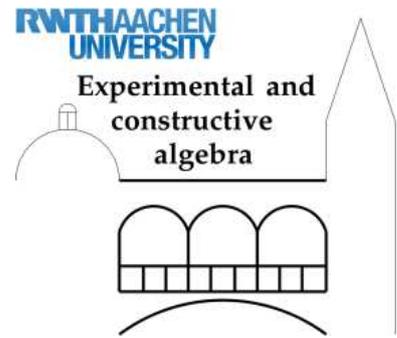


Graduiertenkolleg

# Experimentelle und konstruktive Algebra



## Kolloquiumsvortrag

Dienstag, 6. Dezember 2011, 15:45 Uhr, Hörsaal III

**ALBAN QUADRAT** (INRIA Saclay – Île-de-France, Frankreich):  
***Introduction to algorithmic aspects of algebraic  $D$ -modules***

The purpose of the talk is to give a short overview of some constructive aspects of the theory of algebraic  $D$ -modules (differential modules), a mathematical theory developed by MALGRANGE, BERNSTEIN, SATO, KASHIWARA, ... and which aims at studying general linear systems of partial differential equations by means of module theory, homological algebra, sheaf theory, ... We will focus on the concepts of rings of partial differential operators, Gröbner/Janet basis techniques, free resolutions, extension functors, Auslander regularity and Cohen-Macaulay rings. Then, we will use these techniques to test whether or not a finitely generated left differential module has torsion elements, or is torsion-free, reflexive, projective, stably free or free. We will also show how to compute an important filtration of the torsion submodule of a finitely generated differential module, called the purity/grade filtration, which defines a build-in classification of the torsion elements by means of their grades or codimensions. Our approach will only use elementary techniques of homological algebra, and will avoid the use of spectral sequences of double complexes or derived categories and derived functors as is usually the case in the literature of algebraic  $D$ -modules. Finally, we will interpret different properties of modules in terms of linear systems of partial differential equations.

Wir laden alle Interessierten herzlich ein.

Ab 15:00 Uhr gibt es Kaffee und Tee in der Bibliothek des Lehrstuhl D für Mathematik.