

Seminar

Prof. Christopher Deninger

University of Münster

A pro-algebraic fundamental group for topological spaces and an arithmetic application

Thursday, September 11, 2025

15:30 h

ESI, Schrödinger Lecture Hall

Abstract:

Using the Tannakian formalism we define and study a pro-algebraic fundamental group for connected topological spaces. Using ideas of Nori and a result of Deligne on fibre functors of Tannakian categories we also define a pseudo-torsor under this fundamental group which can serve as a replacement for the universal covering space in this generality. We introduce amalgamated products of pro-algebraic groups in order to prove a Seifert van Kampen theorem. The group of connected components of the pro-algebraic fundamental group is isomorphic to the pro-étale fundamental group used by Kucharczyk and Scholze to exhibit the absolute Galois group of a field K of characteristic zero containing all roots of unity as the fundamental group of an ordinary topological space Y_K . We calculate the pro-algebraic fundamental group of Y_K and show that Y_K also carries a little bit of information about the motivic Galois group of K . If time permits, we also mention categorical criteria derived from the work of Coulembier for the Tannakian dual of a neutral Tannaka category over a perfect field to be reduced or even perfect. Part of this work is joint with Michael Wibmer.

K. Schmidt

September 1, 2025