Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Fakultät für
Mathematik, Informatik
und Naturwissenschaften

Kolloquium über Reine Mathematik

Einladung zu einem Vortrag

Dienstag, 11. Juli 2023

17 Uhr, Geom H4

Prof. Matt Kerr

(Washington University St. Louis)

Higher normal functions and irrationality proofs

Abstract:

R. Apéry's 1978 proof of the irrationality of ζ(3) relied upon two sequences of rational numbers whose ratio limits to ζ(3) very quickly. Beukers and Peters discovered in 1984 that the generating function of the first sequence was a period of a family of K3 surfaces. The corresponding algebro-geometric interpretations for the second generating function and the limit, however, have been missing until recently.

Normal functions are certain "well-behaved'' sections of complex torus bundles, first studied by Poincaré and Lefschetz. They arise in particular from algebraic cycles (formal sums of subvarieties) on families of complex algebraic manifolds. A more general notion of cycles, due to Bloch and Beilinson and closely related to algebraic K-theory and motivic cohomology, leads to generalizations called "higher normal functions". Both sorts are found lurking beneath many an arithmetic or functional property of periods.

In this talk, we offer a brief tour of their unexpected role in Apéry's proof, and in a more general circle of objects surrounding it, including motivic Gamma functions, Feynman integrals, and Apéry constants of Fano varieties. (No knowledge of algebraic cycles will be assumed.)

Vor dem Vortrag (ab 16.30 Uhr) stehen im Foyer vor Hörsaal H4 Kaffee und Tee bereit.