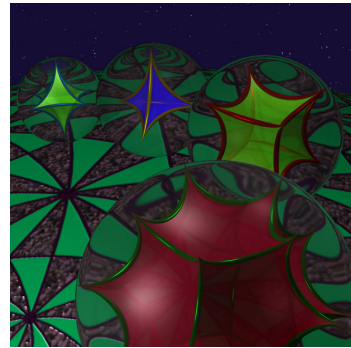


Oberseminar Geometrie
Department of Mathematics
University of Fribourg
Seminar room, Math II (Lonza)
Wednesday October 24, 2018, 10:20-12:00



MATTHIAS SCHYMURA (EPFL)

On the reverse isodiametric problem and Dvoretzky-Rogers-type volume bounds

The isodiametric inequality states that the Euclidean ball maximizes the volume among all convex bodies of a given diameter. We are motivated by a conjecture of Makai Jr. on the reverse question: Every convex body has a linear image whose isodiametric quotient is at least as large as that of a regular simplex. We relate this reverse isodiametric problem to minimal volume enclosing ellipsoids and to the Dvoretzky-Rogers-type problem of finding large volume j -dimensional simplices in any decomposition of the $n \times n$ identity matrix into the sum of m rank-one matrices.

Based on the Cauchy-Binet formula for minors of a product of matrices, we devise a new method that yields, for any given parameter triple (m, n, j) , the strongest known volume bound on such simplices. Curiously, the sharpness of our bounds depends on the existence of certain regular point configurations on the sphere, for example, those induced by many equiangular lines.

As a consequence of these studies, we solve the reverse isodiametric problem for o -symmetric convex bodies and obtain the closest asymptotic bound in the general case. This is joint work with Bernardo González Merino (<https://arxiv.org/abs/1804.05009>).