

VORträge zum Operations Research

Kolloquium des Instituts für Operations Research

Zeit: Dienstag, 17. November 2026, 17:30-19:00 Uhr
Ort: **Gebäude 09.21, Raum 320**
Es spricht: Nathan Sudermann-Merx, DHBW Mannheim
Zum Thema: **Cracking the Heilbronn Triangle Problem: Global Optimization, Symmetry, and Careful Modeling**

The Heilbronn triangle problem asks for a placement of n points in the unit square that maximizes the area of the smallest triangle formed by any three of them. Posed by Hans Heilbronn around 1950, its asymptotic behaviour has been studied by Erdős, Roth, Komlós, Pintz, Szemerédi and others. For small n , however, optimal configurations are known only up to $n = 8$, established by intricate pen-and-paper or computer-assisted proofs, while larger instances have been approached mostly heuristically.

Recently, Modir et al. used MINLP solvers to tackle the case $n = 9$, with a model that proves global optimality within 24 hours. We show that careful modeling reduces this running time to 15 minutes. Our key ingredients are novel symmetry-breaking constraints and the a priori fixing of triangle orientations. These results demonstrate the power of modern global optimization solvers, and at the same time how strongly their performance on cutting-edge problems depends on the model.

Beyond exact solutions, we report new best-known configurations for larger n , for the square as well as for the triangle and general convex variants, obtained with a heuristic search that exploits symmetric point orbits.

Die Vorträge zum Operations Research wenden sich an alle Interessierten!

Bei Rückfragen wenden Sie sich bitte an:
Prof. Dr. Oliver Stein, Institut für Operations Research