Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Lehrstuhl X

Announcement

Seminar on Deformation Quantization and Geometry

30. 1. 2026 at 14:00 s.t.

Seminarroom SE 31

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Elastica (in the sense of Euler) and Rolling Maps on Space Forms

The study of elastica is a meeting point of geometry, analysis, mechanics, and control. Different communities study elastica for different reasons. Each field brought its own language. This inconsistency is not a flaw, as it is evident that the study of elastica is a deep and structurally rich problem, studied already for centuries. The theory of elastica goes back to Leonhard Euler, with the introduction to planar elastica as curves minimizing the bending energy. In the late 1990s, elastic curves were generalized to Riemannian settings through independent variational and control-theoretic approaches, including spline curves on spheres and non-Euclidean elastica formulated via optimal control methods. Subsequent work showed that elastic curves can be characterized as solutions of Riemannian and sub-Riemannian control problems, implicitly suggesting their relation to rolling systems, i.e. rolling without slip or twist. More recently elastica serve as a guiding example leading from curve geometry to Willmore surfaces.

In this talk I will quickly review parts of the history, then focus on the intimate relationship between elastica and rolling. If time permits I might also strive existing relationships to completely integrable systems and even some quantization ideas.

Invited by Stefan Waldmann