Naturwissenschaftlich-Technische Fakultät

UNIVERSITÄT DES SAARLANDES

Der Vorsitzende des Promotionsausschusses

E I N L A D U N G

Hiermit lade ich ein zum öffentlichen Promotionskolloquium von

Herrn M.Sc. Frederic Folz
Theoretische Physik
(Prof. Dr. Giovanna Morigi)

am

Mittwoch, 20. August 2025, 11:00 Uhr s.t.
per Videokonferenz: Link für MS Teams: https://tinyurl.com/kolloquium-folz
Raum für die Prüfung: Gebäude E2.6, Raum E.11

Thema der Dissertation:

Harnessing Stochastic Forces:
Exploring Noise-Induced Phenomena in Physarum-Inspired Network Design Models

In this dissertation, we study models for the design of transport networks inspired by the paradigmatic organism Physarum polycephalum. Beyond characterizing the networks generated in a deterministic setting, we analyze how adding stochastic forces influences the topological properties of the emerging networks as well as their adaptability to dynamically changing environmental conditions. As key results, we report on noise-induced resonances, optimizing the adaptability to external factors as well as the robustness, efficiency, and cost of the resulting networks for finite noise amplitudes. Further, we shed light on the role of the interplay of nonlinear dynamics and stochastic forces in the emergence of these noise-induced phenomena, providing crucial insights for optimization algorithms in general. Our results challenge the traditional notion of noise being detrimental, demonstrating that it can even be used as a resource.

Saarbrücken, 6. August 2025

Prof. Dr.-Ing. Georg Frey