A U S H A N G

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

D I S P U T A T I O N

Dienstag, 2. Juni 2026, 11:00 Uhr

Ort: Seminarraum 2006

(Zuse-Institut Berlin, Takustr. 7, 14195 Berlin)

Disputation über die Doktorarbeit von

Philipp Harth

Thema der Dissertation:

Generative Network Models in Connectomics: Visually Supported Construction and Empirical Analysis

Thema der Disputation:

Wiring Cost Minimization in Physically Embedded Networks

Die Arbeit wurde unter der Betreuung von **Prof. Dr. C. Schütte** durchgeführt.

Abstract: Physically embedded networks are abundant in nature and technical applications. Examples of physical networks in biology range from brain networks at the microscale and vasculature (i.e., the blood vessel system) to the branching patterns of large trees. What are the strategies employed by nature to build networks at minimal cost, and can they inform the design of artificial networks?

In this talk, I first review the well-studied Euclidean Steiner tree problem of connecting a set of spatially embedded points with the help of additional branching nodes. While Steiner trees are known to be optimal with respect to total edge length, additional constraints, such as material cost and the three-dimensional geometry of the links, apply in physical networks. I therefore move from classical Steiner trees to a more recent modeling approach that demonstrates how including the overall surface area of the linkage elements as a cost criterion leads to networks that more closely resemble those found in nature. Finally, I give an outlook on potential parallels between the wiring economy in biologically formed and artificial networks in technical applications.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

Interessierte werden hiermit herzlich eingeladen

Der Vorsitzende der Promotionskommission
Prof. Dr. C. Schütte