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

Freitag, 8. April 2016, 14.00 Uhr

Ort: Übungsraum SR 005, Takustraße 9, 14195 Berlin

Disputation über die Doktorarbeit von

Herrn Robert Lehmann

Thema der Dissertation:

Hunting for Clues on the Circadian Clock in High Throughput and Genomic Data

Thema der Disputation:

The inner clock - Detecting periodicity in gene expression and genomic sequences

Die Arbeit wurde unter der Betreuung von **Prof. Dr. M. Vingron** durchgeführt.

Abstract: Many organisms feature a circadian clock, that times cellular processes in order to adapt physiology and behaviour to the geophysical time. Among prokaryotes, Cyanobacteria are known to harbor such a circadian clock, based on the KaiABC gene cluster. Accordingly, many cyanobacterial strains have been shown to feature large fractions of genes with circadian or diurnal oscillatory expression patterns.

RNA microarray or RNA-seq time-series experiments are increasingly employed to study transcriptional oscillations on a genome-wide scale, but these methods also require large quantities of starting material for hybridization or library preparation. A common solution is to synchronize and mix entire cell populations, thereby effectively measuring average expression over thousands of cells. This approach can complicate the detection of oscillating transcriptional dynamics and conceals biological variation between individual cells. In recent years, sequencing methods have emerged that allow the quantification of mRNA abundance in single cells in order to overcome some of the limitations of established RNA-seq as well as microarray protocols.

I will review an unsupervised learning-based method to identify genes with circadian transcriptional dynamics in single-cell RNA-seq data from an unsynchronized cell population. Furthermore, I will focus on the current knowledge on the function of supercoiling-induced changes in the structural compaction of cyanobacterial ringchromosomes in circadian transcriptional regulation.

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. H. Herzel