



“How proteins shape synaptic dynamics”

Speaker

Prof. Dr. Tatjana Tchumatchenko
*University of Bonn Medical Center
Institute for Experimental Epileptology
and Cognition Research*



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1 PM

Location

**Center for Biostructural Imaging of
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*Von-Siebold-Straße 3a, 37075 Göttingen
Seminar Room*

Abstract

Ever since the first microscopy techniques made it possible to pinpoint the location of mRNAs and proteins of interest in situ, there has been an enduring challenge to understand the organizational principles shaping the localization of molecular species inside a cell. The molecular dynamics and spatial localization of individual transcripts have been classically studied one species at a time using their specific functional role, while the influence of cellular energetics on molecular organization has not been thoroughly investigated, especially in large, compartmentalized cells as neurons.

Here, we show that the macroscopic forces emerging from energy minimization can accurately explain the molecular dynamics, spatial localization patterns, and copy numbers per cell for transcripts with different functional roles inside a cell. We support our quantitative predictions by synthesizing data from six large-scale mRNA and proteomics screens comprising more than ten thousand molecular species. Our goal is to move from molecules to synapses and translate these insights into synaptic plasticity rules. In this talk, I will give an overview of the conceptual challenges at the synaptic and circuit level my group is addressing.