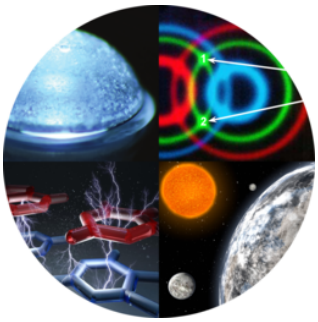

Münchner Physik-Kolloquium

Winter 2019/20

Dissecting nucleic acid electrostatics at the interface of theory and experiments

Dr. Magdalena Gebala, *Department of Biochemistry, Stanford University, USA*

Monday, 4 November 2019, 17:15 h
Hörsaal H 030, Fakultät für Physik der LMU, Schellingstraße 4, München

Electrostatics are a major force in biology, affecting the structure and function of all charged macromolecules in a cell. Nevertheless, the contribution of electrostatics to fundamental aspects of cellular function, such as the mesoscale organization of the cell in membrane-less organelles (1) or the dynamic compaction of chromatin into functional higher-order structures (2), are only poorly understood. The primary barrier to progress has been the lack of experimental approaches to quantitatively study the interactions between macromolecules and the ions required to mitigate their charge. Because the majority of ions that play this role are not site-specifically bound but rather are part of a highly mobile cloud of ions, traditional structural biology techniques (e.g. NMR, X-ray, electron microscopy) are unable to capture the structure and energetic properties of this ion cloud. I will present an experimental approach to overcome this barrier, which allows to 'count' the number of ions thermodynamically associated with a macromolecule or complex and thus to measure the electrostatic properties of even large nucleic acid-protein assemblies such as nucleosomes. Because of the quantitative nature of this method, my experimental results can be directly compared to theoretical predictions (3). This synergy between theory and experiments will provide new, much-needed quantitative models for the structure and function of charged macromolecules in cells.

1. Nott, T. J. *et al.*, Mol. Cell **57**, 936–947 (2015)
2. Sun, J. *et al.*, PNAS **102**, 8180-8185 (2004)
3. Gebala, M. *et al.*, J. Am. Chem. Soc. **137**, 14705 (2015)
4. Allred, B. E. *et al.* J. Am. Chem. Soc. **139**, 7540-7548 (2017)

Student event: Meet the speaker

*We invite you to a **student-only** discussion-round with Dr. Magdalena Gebala before her Munich Physics Colloquium talk.*

Be curious and feel free to ask any question.

Monday, 4 November 2019, 16:00 h,
Room H 522 (5th floor), Fakultät für Physik der LMU, Schellingstraße 4, München