GSI – **BIOPHYSICS SEMINAR**

Thursday, February 19, 2026 at 2 p.m.

Lecture Hall, Theory SB3 3.170a
Planckstraße 1, 64291 Darmstadt

Prof. Dr. Stefan Janssen

Algorithmic Bioinformatics,
Justus Liebig University Giessen, Germany

„ Quantifying the Microbiome"

The human body is not just human. Trillions of microbes—bacteria, fungi, parasites, viruses, and archaea—live on and within us, forming the microbiome: a dynamic ecosystem that shapes our health in ways we are only beginning to understand. Once dismissed as passive passengers, these microscopic partners are now known to influence digestion, immunity, cancer, metabolism, brain function, and even behavior.

A large share of these discoveries comes from 16S rRNA amplicon sequencing, a method that allows us to survey microbial communities at unprecedented scale. Generating the data is now relatively straightforward; making sense of it is not. Microbiome datasets are high-dimensional, sparse, and noisy, reflecting both real biological variation and a surprising amount of technical complexity. What looks like a strong signal can disappear with a different normalization, distance metric, or filtering choice—and what looks like noise can sometimes be the biology itself.

This talk will focus on the computational side of microbiome research: how analysis decisions shape the stories we tell about microbial communities. We will walk through common analytical steps in 16S studies, explore why there is rarely a single “correct” pipeline, and discuss practical strategies for exploring data, checking assumptions, and avoiding over-interpretation. By embracing the uncertainty in microbiome data—and being transparent about how we analyze it—we can extract meaningful patterns without overselling fragile results. The goal is not to eliminate noise, but to learn how to listen for signal in a very loud system.

Organized by Dr. Charlot Vandevoorde and Prof. Dr. Marco Durante
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