UNIVERSITÄT LEIPZIG

Faculty of Physics and Earth System Sciences
Faculty of Life Sciences

Prof. Dr. I. Sodemann
Prof. Dr. K. Taute

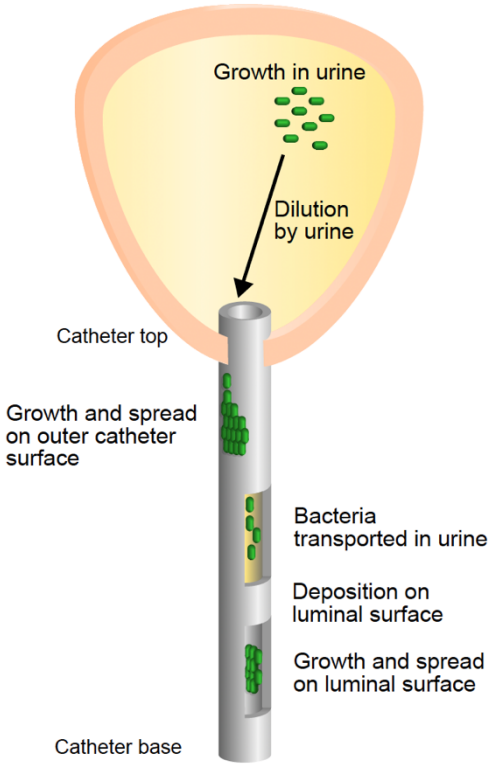
Joined Physics Colloquium
Biochemical Colloquium
b-ACT Colloquium

Tuesday, 29 April 2025 at 16:30

Prof. Dr. Rosalind Allen

University of Jena

Using physics to understand how bacteria infect urinary catheters



Urinary catheters are used extensively in hospitals and long-term care and they are highly prone to infection. Understanding the pathways by which bacteria colonise a urinary catheter could guide strategies to mitigate infection, but quantitative models for this colonisation process are lacking. This is a problem where physics can help to bridge lengscales between bacteria (microns) and catheters (tens of cm). I will describe a mathematical model for bacterial colonisation of a urinary catheter, that integrates population dynamics and fluid dynamics. The model describes bacteria migrating up the outside surface of the catheter, spreading into the bladder and being swept through the catheter lumen. The model exhibits a phase transitions between states corresponding to bacteriuria (bacteria in the urine) vs no bacteriuria. Computer simulations of the model reveal that clinical outcomes for long-term versus short-term catheterisation are controlled by different factors, that could be targeted by different interventions in catheter design and management protocols.

Host: Prof. Dr. Katja Taute

Venue: Universität Leipzig, Faculty of Physics and Earth Sciences
04103 Leipzig, Linnéstraße 5, Small Lecture Hall

Everyone is welcome to a reception with coffee, drinks and cookies in the Aula following the talk.

For an up-to-date semester program, sign-up for the physics colloquium mailing list, and subscription to the digital calendars in CalDAV format, head to the colloquiums web page https://www.physes.uni-leipzig.de/fakultaet/veranstaltungen.