



TECHNISCHE UNIVERSITÄT  
IN DER KULTURHAUPTSTADT EUROPAS  
CHEMNITZ

# Institut für Physik

## Physikalisches Kolloquium

**Donnerstag, 15.05.2025, 15:30 Uhr**

Ort: Reichenhainer Str. 90;

Zentrales Hörsaal- und Seminargebäude, Raum C10.013

**Prof. Dr. Jan Anton Koster**  
Universität Groningen, Niederlande



### **Charge transport phenomena in doped organic semiconductors: towards efficient thermoelectrics**

Organic semiconductors offer a viable alternative to conventional inorganic materials. Their unique properties make them quite special: they are light weight, chemically tunable, and mechanically flexible. Most notably, they can be processed from solution, typically at room temperature, via large-scale methods such as printing. They have been studied in diverse applications such as solar cells, light-emitting diodes, transistors, and thermoelectric devices. Charge transport is critical for all these applications. In order to make rational improvements of the charge transport properties of doped organic semiconductors, a thorough understanding of this rather complex process is needed. The efficacy of doping is governed by a multitude of steps, including the interactions between (ionized) dopants and charge carriers.

In this contribution, I will present our recent work on n-type molecular doping and charge transport studies. Besides studying electrical conductivity, we deliberately include the Seebeck effect as this provides another handle on charge transport. First we show how the solvents used in the doping process can play a crucial and under-reported role. Next, we study how the electrical properties of doped organics depend on dielectric screening effects. Lastly, we show how charge carriers can show a collective behaviour that results in a dielectric catastrophe: the dielectric constant of doped films diverges, which is confirmed by impedance spectroscopy experiments. All in all, these results highlight the importance of carrier-carrier interactions, especially at high doping levels.



Alle Zuhörer sind ab 15:15 Uhr zum Kaffee vor dem Hörsaal eingeladen.