

### Registration

until 17<sup>th</sup> May 2024

<https://form.jotform.com/240812429904052>

### Arrival by train

After your arrival at Braunschweig main station there are two options to get to the hotel.

By bus, from platform A, with Ringbus 429 direction "Braunschweig Hauptbahnhof", 3 stops.

By tram, from platform C, with tram 5 direction "Broitzem", 8 stops.

Ride until the stop "Friedrich-Wilhelm-Platz". From there it is a 500 m walk to the hotel.



### Contact

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<https://www.mvm.kit.edu/english/6543.php>



## 2nd Summer School

### Autonomous Processes in Particle Technology

17<sup>th</sup> – 19<sup>th</sup> of June



### Venue

Steigenberger Parkhotel Braunschweig  
Nimes-Straße 2  
38100 Braunschweig

Content

Dear participants of the SPP2364,

we are already in the second year of our priority programme and with this flyer I want to invite you for the 2. summer school. The school will focus on software sensors. A soft sensor is not a sensor based on physical hardware, but a dependency simulation of variables that can be measured in situ to a target variable that has been precisely determined in the laboratory. This means that the target variable is not measured directly, but calculated using correlated measured variables and a correlation model based on different methods.

I am very happy that Prof. Mangold from the University of Applied Sciences in Bingen will give us an introduction into this topic. He is a well known expert in this field.

We will meet this year in Braunschweig and I want to thank the colleagues there who will organize the meeting.

I am looking forward to welcome you all in Braunschweig for our next exiting summer school.

Prof. Hermann Nirschl

Program

**Topic overview and provisional program**

Monday, 17<sup>th</sup> June 2024

12.00	Welcome and small lunch
13.00-14.30	<b>Introduction</b> Principles of software sensors Observability as prerequisite for model based measurements Observability of linear and nonlinear systems, structural observability
14.30-15.00	Coffee Break
15.00-16.00	<b>Controller based approaches</b> Luenberger observer for linear systems
16.00-16.30	Coffee break
16.30-17.30	Matlab exercise observers (1)
19.00	Common dinner

Program

**Topic overview and provisional program**

Tuesday, 18<sup>th</sup> June 2024

9.00-10.00	<b>Controller based approaches</b> Extensions for nonlinear systems: high gain observer, extended Luenberger observer
10.00-10.30	Coffee Break
10.30-12.00	Matlab exercise observers (2)
12.00-13.00	Lunch
13.00-14.30	<b>Stochastic approaches</b> Kalman Filter for linear systems Extended Kalman filter and unscented Kalman filter Particle filters
14.30-15.00	Coffee break
15.00-16.30	Matlab exercise stochastic filters
16:30-17.00	Coffee Break
17.00-18.00	Application example – Matlab implementation of a software Sensor for a CVD process based on a model with one property coordinate

Wednesday, 19<sup>th</sup> June 2024

9.00-10.00	Hydrogen Campus Salzgitter
10.00-12.00	Tour through the automation by Bosch
12.15	Lunch