

Multiparameter Quantum Sensing and Metrology

827. WE-Heraeus-Seminar

03 – 06 February 2025

at the Physikzentrum Bad Honnef, Germany

**WILHELM UND ELSE
HERAEUS-STIFTUNG**



Program

Sunday, 02 February 2025

17:00 – 21:00 Registration

18:30 *BUFFET SUPPER and informal get-together*

19:30 – 20:20 Nicolas Treps **Modal approach to multi-parameters estimation in optics and the example of incoherent sources**

Monday, 03 February 2025

08:00 *BREAKFAST*

08:45 – 09:00 Gerardo Adesso,
Daniel Braun,
Fedor Jelezko **Welcome words**
Video Wilhelm and Else Heraeus Foundation

09:00 – 09:50 Rafal Demkowicz –
Dobrzanski **Quantum Metrological Theoretical Toolbox - all you need to know to find the optimal protocols!**

09:50 – 10:30 Abolfazl Bayat **Overcoming Quantum Metrology Singularity**

10:30 – 11:00 *COFFEE BREAK*

11:00 – 11:40 Jan Jeske **Cavity-enhanced magnetometry with nitrogen-vacancy centres in diamond**

11:40 – 12:20 Javier Cerrillo **Multiparameter NV Quantum Sensing at Low Frequency, Low Bias Magnetic Field or High Frequency**

12:20 – 12:25 ***Conference Photo***

12:30 – 14:30 *LUNCH*

Program

Monday, 03 February 2025

14:30 – 15:10	Uwe R. Fischer	Self-Consistent Many-Body Metrology
15:10 – 15:30	Marta Maria Marchese	Cascaded Optomechanical Sensing
15:30 – 16:10	Dennis Rätzel	Gravity sensing with quantum optomechanical systems
16:10 – 16:40	<i>COFFEE BREAK</i>	
16:40 – 17:20	Javier Prior	Sensing Inside Biological Systems: Nanodiamonds for Tracking Cellular Inflammation
17:20 – 18:00	<i>Poster Flashes</i>	
18:30	<i>DINNER AND GET-TOGETHER</i>	

Program

Tuesday, 04 February 2025

08:00	<i>BREAKFAST</i>	
09:00 – 09:50	Valeria Cimini	Adaptive multiphase estimation at the quantum bound with integrated photonics circuits
09:50 – 10:30	Mankei Tsang	Quantum estimation with infinitely many parameters
10:30 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:40	Emre Köse	Multi-Parameter Quantum Imaging: From Passive Sensing to Mass Photometry
11:40 – 12:20	Alexander Lvovsky	Mankei's method in application to imaging
12:30 – 14:30	<i>LUNCH</i>	
14:30 – 16:10	<i>Poster Session</i>	
16:10 – 16:40	<i>COFFEE BREAK</i>	
16:40 – 17:20	Arne Wickenbrock	Searching for new physics with quantum sensors
17:20 – 18:00	Renbao Liu	Diamond sensors in complex environments
18:30	<i>HERAEUS DINNER (social event with cold & warm buffet with complimentary drinks)</i>	

Program

Wednesday, 05 February 2025

08:00	<i>BREAKFAST</i>	
09:00 – 09:50	Paola Cappellaro	Multiparameter sensing via control and entanglement
09:50 – 10:30	Ugo Marzolino	Quantum metrology assisted by quantum algorithms
10:30 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:40	Lorenzo Maccone	Quantum optical classifier with superexponential speedup
11:40 – 12:00	Jesus Rubio Jimenez	Symmetry-informed global quantum metrology: towards a multiparameter formulation
12:00 – 12:20	Salvatore Muratore	Superresolution imaging of two incoherent sources via two-photon interference sampling measurements in the transverse momenta
12:30 – 14:00	<i>LUNCH</i>	
14:00 – 16:30	<i>EXCURSION</i>	
16:40 – 17:20	Tuvia Gefen	Quantum precision limits for waveform estimation and noise detection
17:20 – 18:00	Madalin Guta	Optimal estimation of quantum Markov chains using coherent absorbers and pattern counting estimators
18:30	<i>DINNER AND GET-TOGETHER</i>	

Program

Thursday, 06 February 2025

08:00	<i>BREAKFAST</i>	
09:00 – 09:50	Luca Pezzè	Role of entanglement in distributed quantum sensing
09:50 – 10:10	Lorcan Conlon	The role of entangling measurements in quantum multiparameter estimation
10:10 – 10:30	Atmadev Rai	Heisenberg-scaling sensitivity in the simultaneous estimation of multiple parameters using squeezed light
10:30 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:40	Michał Parniak	Interaction-enhanced quantum sensing with Rydberg atoms
11:40 – 12:20	<i>Panel Discussion</i>	
12:30 – 14:30	<i>LUNCH</i>	

End of the seminar and departure

NO DINNER for participants leaving on Friday however, a self-service breakfast will be provided on Friday morning