

Silicon Carbide: Classical and Quantum Technologies

816. WE-Heraeus-Seminar

28 – 31 July 2023

at the Physikzentrum Bad Honnef, Germany

**WILHELM UND ELSE
HERAEUS-STIFTUNG**



Program

Sunday, 28 July 2024

17:00 – 20:00 Registration

18:00 *BUFFET SUPPER, discussions and informal get-together*

Monday, 29 July 2024

08:00 *BREAKFAST*

08:45 – 08:55 Florian Kaiser
Petr Siyushev
Vadim Vorobyov **Opening**

SiC seen from various actors

08:55 – 09:15 Oscar Diez **European commission activities on quantum technologies: The chips act and procurement strategies**

09:15 – 10:00 Heinrich Heiss **SiC quantum magnetometer from innovation to volume production**

10:00 – 10:30 Anna Pertsova
Amos Martinez Garcia **Inside nature family journals**

10:30 – 11:00 *COFFEE BREAK*

Program

Monday, 29 July 2024

Potential applications and use cases

11:00 – 11:30	Heiko Weber	Novel device concepts for the study of charge-photon interaction using epitaxial graphene on 4H-SiC
11:30 – 12:00	Georgy Astakhov	High density optical data storage with atomic defects in SiC over million years
12:00 – 12:30	Matthias Niethammer	Compact SiC-based quantum computing demonstrator
12:30	<i>LUNCH</i>	

Qubit systems in SiC

14:00 – 14:45	Jörg Wrachtrup	tba
14:45 – 15:30	Tim Hugo Taminiau	Towards quantum networks based on the VSi in SiC
15:30 – 16:30	Poster flash session	
16:30 – 17:00	<i>COFFEE BREAK</i>	

Advancing SiC materials I

17:00 – 17:45	Amberly Xie	Generation, control, and fabrication of defects and devices in 4H-silicon carbide
17:45 – 18:15	Roland Nagy	Interaction of Silicon Vacancy Centers in 4H-SiC within electronic devices
18:15	<i>DINNER</i>	
19:45 – 22:00	Poster session, ctd.	

Program

Tuesday, 30 July 2024

07:30 *BREAKFAST*

SiC nanophotonics

08:30 – 09:15 Xiaoke Yi **Cubic silicon carbide for integrated photonic devices**

09:15 – 10:00 Melissa Guidry **Quantum spectroscopy of Kerr frequency combs using silicon carbide integrated photonics**

10:00 – 10:30 *COFFEE BREAK*

SiC colour centres enabling applications

10:30 – 11:00 Andreas Sperlich **Room-temperature silicon carbide maser: Unveiling quantum amplification and cooling**

11:00 – 11:30 Andrei Anisimov **Nuclear spin polarization in SiC using spin-3/2 centers at room temperature in the Earth's magnetic field**

11:30 – 12:00 Robert Cernansky **Quantum sensing of RF fields with 10 Hz spectral resolution using NV centers in Silicon Carbide**

12:00 *LUNCH*

Program

Tuesday, 30 July 2024

Quantum sensing

13:30 – 14:15	Jin-Shi Xu	Preparation and manipulation of single divacancy defects near stacking faults in 4H-SiC
14:15 – 15:00	Naoya Morioka	Photoelectrical readout of electron and nuclear spins in silicon carbide at ambient conditions
15:00 – 15:20	Xiaoyi lai	Single-shot readout of a nuclear spin in silicon carbide
15:20 – 15:40	Pierre Kuna	High fidelity optical readout of a nuclear spin qubit in Silicon Carbide
15:40 – 16:00	Timo Steidl	Tunability of VSi color centers in 4H-SiC nanostructures
16:00 – 16:30	<i>COFFEE BREAK</i>	

Advancing SiC materials II

16:30 – 17:00	Chis Anderson	Mitigating electrical and magnetic noise for SiC qubits
17:00 – 17:30	Marianne E. Bathen	Doping-induced color centers in silicon carbide
17:30 – 18:15	Patrick Berwian	SiC device technology for quantum applications: challenges and prospects
18:15 – 19:00	Jawad Ul-Hassan	Epitaxial growth of SiC for quantum applications
19:00	<i>HERAEUS DINNER</i> (social event with cold & warm buffet with complimentary drinks)	

Program

Wednesday, 31 July 2024

07:30 *BREAKFAST*

Computational modelling of SiC colour centres

08:30 – 09:15 Adam Gali **Theory of SiC defect qubits**

09:15 – 10:00 Benedikt Tissot **Transition metal defects in silicon carbide as telecom quantum memories**

10:00 – 10:30 *COFFEE BREAK*

New colour centres in SiC

10:30 – 11:00 Thomas Astner **Quantum photonics with vanadium in 4H-SiC**

11:00 – 11:30 Joel Davidsson **Exploration of the ADAQ defect database for quantum applications**

11:30 – 12:00 Timur Biktagirov **First-principles study of the NV center in 3C-SiC: A promising solid-state qubit**

12:00 *LUNCH*

Colour centres interacting with their local environment

13:30 – 14:00 Michel Bockstedte **Understanding the spin-selective transitions of color center for quantum applications by ab initio theory**

14:00 – 14:30 Mauricio Bejarano **Parametric magnon transduction to spin qubits in silicon carbide**

14:30 – 15:00 *COFFEE BREAK*

Program

Wednesday, 31 July 2024

Nanophotonics with SiC colour centres

15:00 – 15:45	Daniil Lukin	How solid-state emitters can help us explore new Hamiltonians in cavity QED
15:45 – 16:30	Marina Radulaski	Wafer-scale quantum photonics in silicon carbide
16:30 – 17:00	Florian Kaiser Petr Siyushev Vadim Vorobyov	Poster prize Closing statement

End of the seminar

18:00 *DINNER (for participants leaving on Thursday morning)*

Thursday, 01 August 2024

08:00 *BREAKFAST*

Departure