

Synergistic Mechanisms in Displacive Phase Transitions: From Charge Density Wave Systems to Engineering Materials

832. WE-Heraeus-Seminar

27 Apr - 30 Apr 2025

at the Physikzentrum Bad Honnef, Germany

**WILHELM UND ELSE
HERAEUS-STIFTUNG**



Program

Sunday, April 27, 2025

17:00 – 21:00 Registration

18:00 *BUFFET SUPPER*

Sunday Evening Session

19:30 – 19:45 Gabi Schierning
 Kai Rossnagel

Opening and Welcome

19:45 – 20:30 Kai Rossnagel

**Introduction to charge density
wave systems: materials and
physics**

Program

Monday, April 28, 2025

07:30 *BREAKFAST*

Session 1: CDW physics

08:30 – 09:15 Felix Flicker **Charge order and superconductivity in transition metal dichalcogenides**

09:15 – 10:00 Fernando de Juan **Real charge density waves in TiSe_2 : Nematicity vs chirality and incommensurate states**

10:00 – 10:30 *COFFEE BREAK*

Session 2: Introduction to shape memory alloys

10:30 – 11:15 Jan Frenzel **Introduction to shape memory alloys: materials and applications**

11:15 – 12:00 Klara Lünser **How to combine microstructural and electronic aspects in shape memory alloy research?**

12:00 – 12:10 **Conference Photo**

12:30 *LUNCH*

Session 3: CDW theory

14:00 – 14:45 Thomas Dahm **Electronic transport properties of the shape memory alloy NiTi**

14:45 – 15:30 Tim Wehling **Harnessing the electron-nuclear interplay: From anharmonic charge density wave dynamics to ultrafast quantum geometric effects**

Program

Monday, April 28, 2025

15:30 – 16:00 *COFFEE BREAK*

16:00 – 18:00 **Poster Session**

18:45 *DINNER*

Program

Tuesday, April 29, 2025

07:30 *BREAKFAST*

Session 4: Time and lengths scales of martensitic phase transformations

08:30 – 09:15 Christian Liebscher **In situ and atomic-scale observations of displacive phase transformations in complex materials**

09:15 – 10:00 Sebastian Fähler **Towards a time and length scale bridging understanding of martensitic transformations**

10:00 – 10:30 *COFFEE BREAK*

Session 5: Pre-martensitic features in shape memory alloys and long-range order in CDW materials

10:30 – 11:15 Dominique Schryvers **Some history on the study of pre-martensitic features in Ni-Al**

11:15 – 12:00 Elizabeth Blackburn **Measuring the dynamics hidden in diffuse scattering**

12:30 *LUNCH*

Session 6: CDW dynamics

14:00 – 14:45 Philip Hofmann **Machine learning approaches to understanding the dynamics of CDWs**

14:45 – 15:30 Margaret Murnane **Putting high harmonic generation to work for studying displacive phase transitions**

Program

Tuesday, April 29, 2025

15:30 – 16:00 *COFFEE BREAK*

Session 7: Martensite formation in Fe-based materials

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| 16:00 – 16:45 | Sebastian Weber | Phase stability, martensite formation, and hydrogen embrittlement of austenitic steels |
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| 16:45 | Scientific Organizers | Appreciation of the WEH-Poster awards |
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| | Video contribution | About the Wilhelm and Else Heraeus Foundation |
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| 18:30 | <i>HERAEUS DINNER at the Physikzentrum</i> <i>(cold and warm buffet, with complimentary drinks)</i> | |
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Program

Wednesday, April 30, 2025

07:30 *BREAKFAST*

Session 8: Electronic structure and lattice dynamics in CDW materials

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| 08:30 – 09:15 | Matthieu Le Tacon | Signatures of electron-phonon coupling in the unconventional CDW of cuprate and Kagome superconductors |
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| 09:15 – 10:00 | Santiago Blanco-Canosa | Electronic structure and lattice dynamics of Kagome metals |
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10:00 – 10:30 *COFFEE BREAK*

Session 9: Physics and application of Heusler-based shape memory alloys

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| 10:30 – 11:15 | Oleg Heczko | Martensitic and intermartensitic transformations in Ni-Mn-Ga Heusler compound |
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| 11:15 – 12:00 | Franziska Scheibel | Microstructure and hysteresis design of multicaloric Ni-Mn-based Heusler alloys: from single particle to processed parts |
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| 12:00 – 12:15 | Gabi Schierning Kai Rossnagel | Closing remarks |
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12:30 *LUNCH*

End of seminar and departure