



Program

Summer School IV (Sun 16 - Sat 22 March 2025): "Hyperpolarization"

Youth hostel "Schloss Windischleuba", Pestalozziplatz 1, 04603 Windischleuba

Before you come:

- Read books about NMR in general: Malcolm Levitt: "Spin Dynamics" (Wiley) and K. Ivanov, P.K. Madhu & G. Rajalakshmi "Two-dimensional NMR methods" (Wiley).

- Try to install the program MOLSPIN from <https://molspin.eu/>.

TEACHERS

P.K. Madhu (PKM): QM, ONP on NV centers

Gunnar Jeschke (GJ): CIDEP & CIDNP

Björn Corzilius (BC): DNP

Jennifer Mathies (GM): DNP

James Eills (JE): PHIP, long-lived states

Eike Brunner (EB): SEOP, MEOP, OP on semiconductors

Iliia Solov'yov (IS) & Irina Anisimova: Simulation program MOLSPIN

Sunday 16 March 2025

16.00 Shuttle bus transfer from railway station "Neukieritzsch"

18.00 Shuttle bus transfer from railway station "Neukieritzsch"

Arrival by individual travel, check-in, registration

19.00 Dinner & Get together

20.00-20.30 Opening remarks, Participants introduce each other, About the place

20.30-22.00 **Lecture 01: PKM: Overview**

Monday 17 March 2025

08:00-09:00 Breakfast

09.00-10.30 **Lecture 02: JE: Introduction to PHIP**

10.30-11.00 Coffee/tea

11.00-12.30 **Lecture 03: BC: Solid-effect, thermal mixing, cross-effect**

12.30-13.00 Lunch

13.00-14.00 Break/visit of the castle/volleyball/garden & walk

14.00-15.30 **Lecture 04: JE: Polarization transfer**

15.30-16.00 Coffee/Tea/Cake

16.00-17.30 **Lecture 05: BC: MAS DNP, instrumentation, applications, developments**

18.00-19.00 Dinner

19.00-20.30 **Lecture 06: GM: Overhauser DNP, instrum., applications, developments**

Afterwards: IS: assistance in installing MOLSPIN

Tuesday 18 March 2025

08:00-09:00 Breakfast
09:00-10:30 Lecture 07: BC: dDNP & bullet DNP incl. instrumentation and enhanced MRI

10.30-11.00 Break
11.00-12.30 Lecture 08: GM: Polarizing agents

12.30-13.00 Lunch
13.00-14.00 Break
14.00-15.30 Lecture 09: GM: Pulsed DNP, triplet DNP
15.30-16.00 Coffee/Tea/Cake
16.00-17.30 Lecture 10: GJ: SCRPs, CIDEF, liq CIDNP
18.00-19.00 Dinner
19.00-20.30 Exercise 1: IS: Modelling DNP effects in molecular systems with MOLSPIN

Wednesday 19 March 2025

07.00-07.30 Breakfast
07:30 Starting by coach to Freiberg
09:00-13:30 Mine tour / 3 groups successively for 1,5 hours
14:00 Return by coach
16:30-18:00 Lecture 11: GJ: Solid-state photo-CIDNP, part I
18.15-19.00 Dinner
19.00-20.30 Exercise 2: IS: Basics of liquid-state photo-CIDNP with MOLSPIN

Thursday 20 March 2025

08:00-09:00 Breakfast
09:00-10:30 Lecture 12: GJ: Solid-state photo-CIDNP, part II
10.30-11.00 Break
11.00-12.30 Lecture 13: PKM: NV centers, part I

12.30-13.00 Lunch
13.00-14.00 Break
Foto
14.00-15.30 Lecture 14: GJ: Quantum-rotor induced nuclear hyperpolarization
15.30-16.00 Coffee/Tea/Cake
16.00-17.30 Lecture 15: PKM: NV centers, part II
18.00-19.00 Dinner
19.00-20.30 Exercise 3: IS: Basics of solid-state photo-CIDNP with MOLSPIN

Friday 21 March 2025

08:00-09:00 Breakfast
09:00-10:30 Lecture 16: EB: SEOP
10.30-11.00 Break
11.00-12.30 Lecture 17: JE: State-of-the-art and beyond

12.30-13.00 Lunch
13.00-14.00 Break
14.00-15.30 Lecture 18: EB: Other optimal pumping based methods & practical aspects
15.30-16.00 Coffee/Tea/Cake
16.00-17.30 Exercise 4: IS: Modelling effects of spin relaxation in spin dynamics calculations using MOLSPIN

Feedback by students, Final remarks

19.00-21.00 Conference Dinner
Open end outside the eating room

Saturday 22 March 2025

07.30-09:30 Breakfast

10:15 Travelling home (direct bus transfer to Leipzig central station/Hbf)