

**PERSONAL INFORMATION**

Family name, First name: **Čermák, Petr**  
Researcher unique identifier: <https://publons.com/researcher/S-6152-2016/>  
<https://orcid.org/0000-0002-4176-6905>  
Date of birth: 17. 03. 1986  
Nationality: Czech  
Scientific homepage: <https://cermak.science/>

**• EDUCATION**

2014 PhD in Physics of Condensed Matter and Materials Research  
Department of Condensed Matter Physics, Faculty of Mathematics and Physics, Charles University, Czech Republic  
Prof. Pavel Javorský  
2010 Master's in physics  
Department of Condensed Matter Physics, Faculty of Mathematics and Physics, Charles University, Czech Republic

**• CURRENT POSITION**

2018 – now PostDoc / Scientific researcher in the group of Magnetic studies  
Department of Condensed Matter Physics, Faculty of Mathematics and Physics, Charles University, Czech Republic  
*I am employed at MGML national research facility, mainly responsible for 20T magnet and dilution refrigerator. I help our users and students to perform their bulk measurements. Important part of my job is development and maintenance of our user office system Prius.*

**• PREVIOUS POSITIONS**

2018 Head developer of the automated camera recognition software (**computer vision**) for production line.  
Label Design, Czech Republic (producer of high-quality self-adhesive labels)  
*After leaving FZ Jülich I had 2-month gap before starting my job at Charles University. Initially 2-month contract at private company was prolonged for almost 1 year in order to finish the project. I learned how to lead the team and develop commercially feasible device.*  
2013 – 2018 Instrument Responsible at Three Axis Spectrometer PANDA  
Forschungszentrum Jülich GmbH outstation at MLZ, Garching, Germany  
*My task was to operate, maintain and develop state of the art neutron spectrometer. Only three such machines exist in Europe (PANDA, ThALES and IN12)*  
2012 – 2013 PhD fellowship  
Institute Laue Langevin, Grenoble, France  
*I was developing spectrometer ThALES and measuring data for my thesis.*

**• TEACHING ACTIVITIES**

*I enjoy teaching although it is not my primary activity. Helping students allows me to relax from research.*

2018 – now Mechanics: Exercise Seminar, Charles University, CZ (50 – 90 students per year)  
2013 – 2017 Tutor of JCNS Laboratory Course - Neutron Scattering, FZ Jülich, Garching, DE

- **ORGANISATION OF SCIENTIFIC MEETINGS**

*I feel important to exchange knowledge between different group of scientists and I am experienced with neutron scattering. Therefore, I am organizing events to strengthen Czech neutron community. I also organized workshops about neutron resolution calculation where I co-develop software suite.*

- 2017 Triple Axis Resolution Workshop, MLZ, Garching, DE (30 participants)  
<https://doi.org/10.1080/10448632.2017.1342483>
- 2018 The triple axis resolution workshop, Charles University, Prague, CZ (20 participants)  
<https://www.illcz.cz/>
- 2019 EHPRG satellite workshop “Modern trends in Neutrons under Extreme Pressures”, European High Pressure Research Group Meeting 2019, Prague, CZ (50 participants)  
<https://neutron.press/>

- **INSTITUTIONAL RESPONSIBILITIES**

- 2018 – now **Local Contact** at Materials Growth & Measurement Laboratory (MGML.eu), Prague, Czech Republic
- 2018 – now Implementation of the **open source instrument control software** NICOS at MGML (see software section below), Prague, Czech Republic
- 2019 – now Organizer of **regular Czech Neutron Community meetings** (see <https://neutron.beer/>), Department of Condensed Matter Physics, Charles University, CZ

- **REVIEWING ACTIVITIES**

- 2017 – 2020 Member of FAP 4 (Facility access panel), ISIS Neutron and Muon Source, UK  
<https://www.isis.stfc.ac.uk/Pages/FAP-Members.pdf>
- 2018 Outstanding reviewer status, Elsevier (Intermetallics, J. Magn. Magn. Mater, Physica B)

- **MAJOR COLLABORATIONS**

*See below for common papers and details about collaboration.*

Prof. Pfeleiderer, **Multi-Component Electronic Correlations**, TU Munich, Germany  
 Prof. Loewenhaupt, **Crystalline electric field broadening**, TU Dresden, Germany  
 Prof. Jinsheng Wen, **Inelastic neutron experiments**, Nanjing University, China  
 Prof. Dr. Huiqian Luo, **Neutron experiments on heavy fermions**, Chinese Academy of Sciences, Beijing

- **FUNDING**

- 2011 – 2013 Charles University Grant Agency #348511 (as PI)  
“Study of magnetic structure of  $R_2TIn_8$  materials”  
32 k€
- 2005 – 2019 **Neutron facility experiments:**  
over 25 funded neutron experiments (neutron sources: ILL, MLZ, ISIS, PSI, HZB)  
roughly 130 beamdays, cost equivalent equiv. 1.3 M€.
- 2013 – 2018 I was employed in Forschungszentrum Jülich, member of Helmholtz association.  
Employees of Helmholtz association are **not allowed to ask for external funding**. See more in track record.

- **SCIENTIFIC SOFTWARE DEVELOPEMENT**

- 2012 – 2013 Esmeralda Laue Suite (<https://lauesuite.com>)
- 2015 – 2019 CrysFiPy – Crystal Field Python package (<https://crysfi.py.rtfid.io>)
- 2014 – now NICOS contributor (<https://nicos-controls.org>)
- 2018 – now Python Research Infrastructure User System (<https://github.com/me2d09/prius> and released version at <https://user.mgml.eu> )

## • TRACK RECORD

The course of my scientific career was clear early on from the time when I performed my **first neutron experiment** alone at the large-scale facility Helmholtz Zentrum Berlin as a master's student. During my doctoral studies at Charles University in Prague, my interest in neutron scattering grew. I was selected for a one-year PhD fellowship at the world's largest neutron source, ILL, in France (<https://www.ill.eu>), as a representative of the Central European Neutron Initiative (CENI). There, I become an **expert on neutron scattering**, and already during my PhD, I moved to Heinz Meier-Leibnitz Zentrum (MLZ) in Garching as a second instrument responsible for the PANDA spectrometer. My task was to operate, maintain and develop the state-of-the-art neutron spectrometer.

I worked for five years on PANDA, employed by Forschungszentrum Julich, which is a member of the German Helmholtz Association. Employees of the Helmholtz Association are not normally allowed to ask for external funding, so I have none of my own grant applications from this period. Our work was evaluated as part of the program-oriented funding and was always rated as excellent. My duty was to support MLZ users from various fields of condensed matter physics and develop the instrument. I was part of the German Federal Ministry of Education and Research (BMBF)-supported €1.4M project **BAMBUS**, where we developed a state-of-the-art multianalyser for the PANDA spectrometer. I gained a tremendous amount of experience and started collaborating with several **world-leading neutron scattering groups** (the Inosov group at TU Dresden, the Janoschek group at the Paul Scherrer Institute, the Pfleiderer group at TU Munich and the Jinsheng Wen group at Nanjing University).

- I have substantial knowledge of advanced crystal field treatment, phonon–crystal field coupling, data visualization, magnetic structures refinement, Laue neutron diffraction and data evaluation.
- I am an expert in neutron triple-axis spectroscopy, resolution calculations and advanced data reduction and fitting and organized several workshops on it.
- I actively participated in development of the ThALES spectrometer at ILL and the PANDA spectrometer at MLZ.
- I am a programmer, and I contribute to several open source Python and Fortran projects.
- I know solutions. **I lead the development** of computer vision solutions for a private company in past. Now I have decided to fully engage in science and ended private sector activities.

**Total publications in peer-reviewed journals: 28**

10x first author, 1x PRX, 2x Nature Comm., 1x PNAS, 4x PRL, 6x PRB, h-index = 7

### *Invited lectures:*

1. LNS seminar, Paul Scherrer Institute, Villigen, Switzerland, 2019, <https://www.psi.ch/>
2. SwedNess course in neutron spectroscopy, Chalmers, Göteborg, 2018, <https://swedness.se/>

**Total presentations at international conferences:** Seven oral and more than 30 posters.

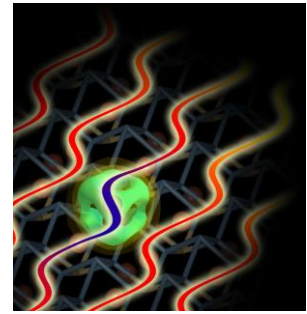
Selected **invited speaking engagements and contributing talks** made to international conferences:

1. “Hybridized excitations in CeAuAl<sub>3</sub>” (invited, <https://indico.frm2.tum.de/event/171/>)  
@ Frontiers in Quantum Condensed Matter Research with Neutrons 2019, Garching
2. “Neutrons as a key method for accessing magnetoelastic effects”  
@ ECNS 2019, St. Petersburg, <http://ecns2019.com/>
3. “Analysis of magneto-elastic hybridized effects due to the CEF”  
@ ICM 2018, San Francisco, <http://www.icm2018sf.org/>
4. “Magnetoelastic hybrid excitations in non-centrosymmetric tetragonal CeTAl<sub>3</sub>”  
@ SCES 2017, Prague, <http://sces2017.org/>
5. “A novel hybridized crystal field–phonon excitations”  
@ JEMS 2016, Glasgow, <http://jems2016.iopconfs.org/>

**Five most important publications:**

- 1) P. Čermák, A. Schneidewind, B. Liu, M. M. Koza, C. Franz, R. Schönmann, O. Sobolev, C. Pfleiderer, Magnetoelastic hybrid excitations in  $\text{CeAuAl}_3$ , **Proceedings of the National Academy of Sciences** **116** (14) (2019) 6695-6700.
- 2) B. Liu, P. Čermák, C. Franz, C. Pfleiderer, and A. Schneidewind, Lattice dynamics and coupled quadrupole-phonon excitations in  $\text{CeAuAl}_3$ , **Phys. Rev. B** **98** (2018) 174306.

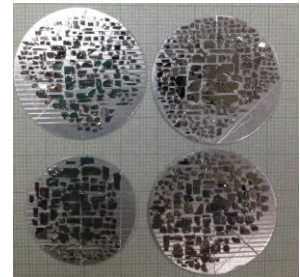
*These two publications deal with magnetoelastic coupling. We have revealed new excitations and started to deal with them in more detail. It took three years of measurement and discussions with theoreticians to explain the measured data. I formed a team with my colleagues B. Liu and A. Schneidewind (first instrument responsible for PANDA). B. Liu developed the theory (paper 2), and I did all the measurements and supervised the project. A. Schneidewind supported the whole team with her instrumentation knowledge. We heavily conferred with “the owner” of the sample, Prof. Pfleiderer, and our efforts finally resulted in the PNAS publication (paper 1). Our work was mentioned in the press: [1], [2], [3 German], [4 German] IF 2017: 9.504, Altmetrics: 30*



*The coupling of phonons to the crystal electric field are much more generic than hitherto thought.*

- 3) Y. Song, J. Van Dyke, I. K. Lum, B. D. White, S. Jang, D. Yazici, L. Shu, A. Schneidewind, P. Čermák, Y. Qiu, M. B. Maple, Dirk. K Morr, P. Dai, Robust upward dispersion of the neutron spin resonance in the heavy fermion superconductor  $\text{Ce}_{1-x}\text{Yb}_x\text{CoIn}_5$ , **Nat. Commun.** **7** (2016) 12774.

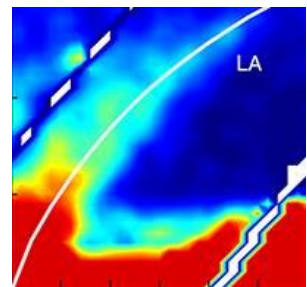
*As an instrument scientist, I am the co-author of several high-ranked papers, but this one is special because we invested a lot of effort and I was not only “the local contact”.  $\text{CeCoIn}_5$  is a prototypical unconventional superconductor that has been known for decades, but we have revealed details about it that had not been observed before. We faced several challenges during the measurements, the most difficult of which was to get enough of the sample. I learned how to manually co-align small crystals. Press coverage here: [phys.org](http://phys.org), IF 2017: 12.353, Altmetrics: 19*



*Hundreds of tiny samples co-aligned and glued onto aluminium plates.*

- 4) J. Wang, K. Ran, S. Li, Z. Ma, S. Bao, Z. Cai, Y. Zhang, K. Nakajima, S. O. Kawamura, P. Čermák, A. Schneidewind, S. Savrasov, X. Wan, J. Wen, Evidence for singular-phonon-induced nematic superconductivity in a topological superconductor candidate  $\text{Sr}_{0.1}\text{Bi}_2\text{Se}_3$ , **Nat. Commun.** **10** (2019) 2802.

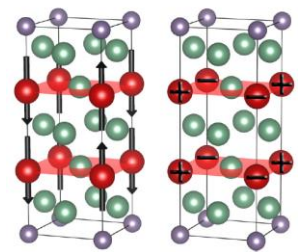
*Cooperation with Prof. Wen’s group deals with unconventional superconductors. By performing inelastic neutron measurements on a prime candidate for realizing topological superconductivity, we revealed highly anisotropic phonons with increasing linewidths at long wavelengths. Such observation indicates a large ME coupling, which we propose gives rise to the exotic  $p$ -wave nematic superconducting pairing. IF 2017: 12.353*



*Measured phonon dispersion along [001] direction.*

- 5) P. Čermák, P. Javorský, M. Kratochvílová, K. Pajskr, M. Klicpera, B. Ouladdiaf, M.-H. Lemée-Cailleau, J. Rodriguez-Carvajal, M. Boehm, Magnetic structures of non-cerium analogues of heavy-fermion  $\text{Ce}_2\text{RhIn}_8$ : The case of  $\text{Nd}_2\text{RhIn}_8$ ,  $\text{Dy}_2\text{RhIn}_8$ , and  $\text{Er}_2\text{RhIn}_8$ , **Phys. Rev. B** **89** (2014) 184409.

*The fifth highlighted paper is the last paper published together with my PhD supervisor and the last paper coming from my doctoral thesis. It summarizes the results that I obtained during my stay at the ILL neutron source. It helped me to start my career in the field of neutron scattering.*



*Determined magnetic structures.*