List of Post-Doctoral Fellowships

A new call for applications has been announced !

Applicants can apply in 2023 for positions in projects announced by following faculties / institutes:

1. First Faculty of Medicine : 2 projects
2. Faculty of Education : 4 projects
3. Faculty of Arts : 3 projects
4. Faculty of Humanities : 3 projects
5. Faculty of Social Sciences : 3 projects
6. Faculty of Mathematics and Physics : 5 projects
7. Faculty of Science : 8 projects
8. Faculty of Law : 10 projects
9. Faculty of Medicine in Pilsen : 2 projects
10. Faculty of Pharmacy in Hradec Králové : 2 projects

Deadlines of submitting of applications you will find under each specific project. More detailed information about general conditions of applying for positions funded by JUNIOR Fund you can find on the website: JUNIOR Fund (Post-doc) .

First Faculty of Medicine

|1| Title of the research project:

	**IMPROVING LABORATORY DIAGNOSTICS OF NEURODEGENERATIVE DISEASES BY SEED AMPLIFICATION ASSAYS: STRUCTURAL FIDELITY OF AMYLOID AGGREGATION**

Description:
Number of people suffering from neurodegenerative diseases, like Alzheimer and Parkinson disease, is quickly increasing. The available treatment options are limited and the cost of care for the patients is massive. Early diagnosis of neurodegenerative diseases is difficult, and the rate of misdiagnosis high even in specialized centres. There is a pressing need to find reliable biomarkers allowing confirmation of the diagnosis and future population screening. Neurodegenerative diseases are defined by deposits of specific misfolded proteins in the brain tissue. Harnessing prion like activity of these pathologically folded proteins for their detection by seed amplification assay is one of the most promising diagnostic strategies (1). The misfolded protein in patient sample triggers misfolding and aggregation of recombinant protein substrate which is detected in real time using fluorescent probe. The assay was originally developed for detection of prions, but its variants for other amyloid forming proteins like alpha synuclein and tau are being developed by different laboratories around the globe. Our laboratory was first to implement RT-QuIC assay for detection of prions (2) in Visegrad countries and we are now exploring the utility of the RT-QuIC assay for detection of other pathologically folded proteins. One of the outstanding questions is if the aggregated products of the seed amplification assays carry the information about the conformation of original pathological seeds (3) and if this information can be used to improve the assay diagnostic potential. The proposed project is aiming to investigate structural fidelity of amyloid aggregation utilizing prion and alpha synuclein RT-QuIC assays, various recombinant substrates, well defined pathologic seeds and different assay conditions. Structural studies utilizing proteomic and spectroscopic methods will be carried out in collaboration with expert groups at Czech Academy of Science and patient samples obtained from collaborating Neurology clinic and National reference laboratory for human prion diseases.

References:
1. Vascellari S, Orr? CD, Caughey B. Real-Time Quaking- Induced Conversion Assays for Prion Diseases, Synucleinopathies, and Tauopathies. Front Aging Neurosci. 2022 Mar 10;14:853050.
2. Moško T, Galušková S, Matěj R, Brůžová M, Holada K. Detection of Prions in Brain Homogenates and CSF Samples Using a Second-Generation RT-QuIC Assay: A Useful Tool for Retrospective Analysis of Archived Samples. Pathogens. 2021 Jun 13;10(6):750.

3. Standke HG, Kraus A. Seed amplification and RT-QuIC assays to investigate protein seed structures and strains. Cell Tissue Res. 2023 Apr;392(1):323-335. doi: 10.1007/s00441-022-03595-z.

Qualifications:
- Ph.D. in neurosciences, cell biology, biochemistry or equivalent.
- Prior experience with molecular biology method, recombinant protein purification and protein structure research will be appreciated.

Workplace/Institution: Institute of Immunology and Microbiology, First Faculty of Medicine, Charles University and General University Hospital in Prague
Supervisor: Assoc. Prof. Karel Holada, Ph.D.
E-mail of the supervisor: karel.holada@lf1.cuni.cz
Position available from: January 1, 2024

Deadline date for applications: July 21, 2023
Applicants must submit required documents **to**: Anna Jezberová anna.jezberova@lf1.cuni.cz

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|2| Title of the research project:

	**INVESTIGATING THE EFFICACY OF BEHAVIOURAL SPEECH THERAPY IN PARKINSON'S DISEASE PATIENTS TREATED WITH DEEP BRAIN STIMULATION**

Description:
Deep brain stimulation of the subthalamic nucleus (STN-DBS) is an effective treatment of motor symptoms of Parkinson's disease (PD), but its effects on speech are equivocal. Although some aspects of speech might improve with STN-DBS, stimulation-induced dysarthria represents the most common side effect, with a prevalence of up to 90% (Krack et al. 2003). Recently, the effectiveness of new behavioral speech therapy called SPEAK OUT!® has been demonstrated in group of PD patients treated with antiparkinsonian medication (Behrman et al. 2020). This therapy is based on principles of motor learning, where patients learn to convert speech from an automatic function to an intentional once. Compared to most popular behavioural speech therapy 'Lee Silverman Voice Treatment', which focuses mainly on improvement of vocal loudness, SPEAK OUT® program aims to increase patient's awareness of breath support, enhance their coordination between the respiratory and laryngeal systems, improve vocal intensity, and refine speech intonation, cognition, and conversation abilities (Behrman et al. 2020). The effectiveness of SPEAK OUT® speech therapy in PD patients with STN-DBS has never been investigated (Tripoliti et al. 2011). Therefore, the main aim of the study is to evaluate the effectiveness and suitability of SPEAK OUT® therapy in STN-DBS PD patients compared to dopaminergic medication only treated PD. The other aims of the project are to assess the minimum number of repetition for short vocal tasks required to obtain the representative acoustic assessment of speech performance and to provide new acoustic methods necessary for feedback during speech therapy in PD (Kryze et al. 2021; Rusz et al. 2021). The choice of suitable speech therapy can help patients to regain and retain their speech and communication skills while minimizing swallowing issues and therefore improve their quality of life.
Thus, the objectives of the proposed Junior project will be to 1) evaluate the effectiveness and suitability of SPEAK OUT speech therapy in STN-DBS PD patients compared to dopaminergic medication only treated PD; 2) assess the minimum number of repetition for short functional vocal tasks (i.e. sustained phonation and syllable repetition) required to obtain the representative acoustic assessment of speech performance necessary for feedback during speech therapy in PD; 3) to provide new acoustic methods suitable for feedback during speech therapy in PD.

References:
Behrman A, Cody J, Elandary S, Flom P, Chitnis S. The Effect of SPEAK OUT! and The LOUD Crowd on Dysarthria Due to Parkinson's Disease. Am J Speech Lang Pathol. 2020 Aug 4;29(3):1448-1465. doi: 10.1044/2020_AJSLP-19-00024.
Krack P, Batir A, Van Blercom N et al. Five-year follow-up of bilateral stimulation of the subthalamic nucleus in advanced Parkinson's disease. N Engl J Med 2003; 349: 1925-1934.
Krýže P, Tykalová T, Růžička E, Rusz J. Effect of reading passage length on quantitative acoustic speech assessment in Czech-speaking individuals with Parkinson's disease treated with subthalamic nucleus deep brain stimulation. J Acoust Soc Am. 2021 May;149(5):3366. doi: 10.1121/10.0005050.
Rusz J, Tykalova T, Ramig LO, Tripoliti E. Guidelines for Speech Recording and Acoustic Analyses in Dysarthrias of Movement Disorders. Mov Disord. 2021 Apr;36(4):803-814. doi: 10.1002/mds.28465.
Tripoliti E, Strong L, Hickey F, Foltynie T, Zrinzo L, Candelario J, Hariz M, Limousin P. Treatment of dysarthria following subthalamic nucleus deep brain stimulation for Parkinson's disease. Mov Disord. 2011 Nov;26(13):2434-6. doi: 10.1002/mds.23887.

Qualifications:
- Ph.D. degree in biophysics with focus on speech science and therapy (defended 2019)

- Ability to communicate in both spoken and written English, and at least basic Czech (to communicate with patients)
- High motivation, ability to conduct collaborative research.

Funding: Position will be co-financed from projects funded by the National Institute for Neurological Research (Programme EXCELES, ID Project No. LX22NPO5107 - Funded by the European Union – Next Generation EUs).
Workplace: Department of Neurology, First Faculty of Medicine, Charles University and General University Hospital in Prague
Supervisor: Assoc. Prof. Jan Rusz, Ph.D.
Position available from: January 1, 2024

Deadline date for applications: July 21, 2023
Applicants must submit required documents **to**: Anna Jezberová anna.jezberova@lf1.cuni.cz

Faculty of Education

|1| Title of the research project:

	**FOSTERING PRE-SERVICE TEACHERS' SCIENCE PROCESS SKILLS**

Science education researchers have, recently been focusing on science experiments' role in science education. Since there is a lack of evidence about experiments' real added value in the process, methods of students' science process skills' fostering are necessary to be described closer. The post-doc researcher's topic is to map pre-service teachers' skills when entering science laboratory as well as their skills' improvement in reaction to common lab tasks. Their progression on the lab works will be recorded by a set of cameras, later in the project eye-tracking goggles will be used too. It is expected the post-doc will join the department members in their research activities, will be responsible for data collection, analysis as well as its presentation and publication.

Workplace: Department of Chemistry and Chemistry Education (Faculty of Education, Charles University)
Supervisor: doc. PhDr. Martin Rusek, Ph.D.
E-mail: martin.rusek@pedf.cuni.cz
Position available from: January 1, 2024

Deadline date for applications: July 31, 2023
Applicants must submit required documents **to:** Eliška Šmerdová eliska.smerdova@pedf.cuni.cz (faculty coordinator of the Junior Fund)

|2| Title of the research project:

	**PEDAGOGICALLY PRODUCTIVE TALK AMONG UNIVERSITY TEACHERS: LEARNING THROUGH DIALOGIE**

The Department of Pre-Primary and Primary Education in the Faculty of Education offers a postdoctoral position in the area of research on pedagogically productive conversation among university teachers and their learning through dialogue. The research focuses on conversations among university teachers and examines how the concept of pedagogically productive talk is used in these conversations. Pedagogically productive conversation is a collaborative discourse among teachers that combines six principles that involve socializing teachers into productive ways of talking and thinking about practice, a disposition to reflect on and improve practice, and a commitment to student learning and teaching excellence (Lefstein et al., 2020). The research may include both quantitative and qualitative research and targeted questioning through surveys and structured interviews. Researching and improving teachers' pedagogical competencies plays a key role, especially in improving the quality of teaching and learning in higher education (Kaynarda?, 2017), so we perceive a high relevance of the project.

Workplace: Department of Pre-primary and Primary Education
Supervisor: doc. PhDr. Jana Stará, Ph.D.
E-mail: jana.stara@pedf.cuni.cz
Position available from: January 1, 2024

Deadline date for applications: July 31, 2023
Applicants must submit required documents **to:** Eliška Šmerdová eliska.smerdova@pedf.cuni.cz (faculty coordinator of the Junior Fund)

|3| Title of the research project:

	**EDUCATIONAL AND SCHOOL PSYCHOLOGY**

The Department of Psychology is strongly focused on mechanisms of school learning and underlying processes relevant to educational and school psychology. Our research projects focus on different groups of actors (students, teachers, parents, school psychologists, etc.) and on different topics (cognition, communication, identity, development etc.).
Many students have a difficult background or get in trouble during schooling. They face a variety of challenges related to their cognition and emotions, self-esteem, social relationships, and developmental needs. This places also great demands on adults inside (teachers, headmasters, school counselors) and outside the school (parents, local authorities, etc.) who need to be educated and supported. Psychology can help address this challenging situation.
As the Department of Psychology, we welcome proposals for postdoc projects that would suit the above focus and complement the existing research developed by our team. Proposals should seek to describe the current needs of schools and their actors, name critical areas, analyze their changes and formulate appropriate recommendations that would increase the effectiveness of learning and teaching. The research proposals can focus on students (different subgroups as socially disadvantaged, with specific cultural backgrounds, mentally challenged, learning disabled, gifted, etc.), teachers or parents (their attitudes, competencies, identities, or practices), or it can combine these groups of actors. The range of topics from current research projects at the Department of Psychology on which Postdoc projects might concentrate (but not necessarily only):

- learning and metacognition
- psychological factors in school success and failure
- social climate in groups
- parental regulation of risky behavior, e.g. overuse of digital technologies
- teacher professional development, enhancing self-reflection
- student well-being, belonging, and social identity
- gender identity and sexual orientation
- neurodiversity in education

Workplace: Department of Psychology (Faculty of Education, Charles University)
Supervisor: Assoc. Prof. Irena Smetáčková, Ph.D.
E-mail: irena.smetackova@pedf.cuni.cz
Position available from: January 1, 2024

Deadline date for applications: July 31, 2023
Applicants must submit required documents **to:** Eliška Šmerdová eliska.smerdova@pedf.cuni.cz (faculty coordinator of the Junior Fund)

|4| Title of the research project:

	**CONTEXTUALIZED SECONDARY DATA ANALYSIS OF INTERNATIONAL LARGE SCALE ASSESSMENT DATA (E.G. PISA, TIMSS)**

International large-scale assessments (ILSAs - namely PISA, TIMSS, PIRLS, ICCs, TALIS, PIAAC) provide a unique source of data freely available for analysis and allowing international comparisons. Handling such data requires a substantive methodological knowledge, e.g. how to work properly with complex designs, use replication weights, properly work with plausible values, etc. We look for a post-doc with experience and good knowledge of working with such data, ideally using Mplus or R software for multilevel and/or structural equation modelling. Yet substantive quantitative knowledge needs to be backed up with knowledge of educational policy and country specific information, which allows to formulate policy-relevant research question for comparison. We offer the high knowledge of Central and Eastern European Countries and context for analysis of policy relevant issues based on the available ILSAs data which shall be the main emphasis of post-doc work. Also, data from ILSAs in post-Socialist countries are often not sufficiently analysed due to lack of researchers and methodological knowledge. The analysis could be oriented, but is not limited to, the following topics: the effects of early tracking, Big Fish Little Pond Effect, relationship between motivation and self-concept and achievement, socio-economic inequalities, rural-urban differences, gender inequity, class composition and peer effects, teacher quality and teacher beliefs. Applicant shall choose one or two topics to specify in their post-doc application project proposal.

Workplace: Institute for Research and Development of Education
Supervisor: Dr. David Greger
E-mail: david.greger@pedf.cuni.cz
Position available from: January 1, 2024

Deadline date for applications: July 31, 2023
Applicants must submit required documents **to:** Eliška Šmerdová eliska.smerdova@pedf.cuni.cz (faculty coordinator of the Junior Fund)

Faculty of Arts

|1| Title of the research project:

	**TOWARDS A CONTRASTIVE FUNCTIONAL GRAMMAR FOR NON-NATIVE LEARNERS: TACKLING THE FUNCTION IN SLAVIC LANGUAGES**

Description of the project:
The Institute of Czech Studies is seeking a highly qualified international post-doc researcher in the field of linguistics and/or Czech/Slavic Studies. The researcher is expected to focus on the theoretical framework for comparative functional grammar for non-native learners of Czech and Polish. The main research task will be description of grammatical means in terms of their communicative functions. The researcher should be ready to take part in the activities and ongoing projects of the Institute, especially in the organisation of workshops and conferences in 2024.

The successful candidate is expected to carry out independent research and teach two courses per semester in English. At the level of the research, the researcher is expected to publish at least one high quality article in a database journal during the project. Moreover, by the end of the project, the successful candidate will be encouraged to apply for a research grant (to be further discussed with the host institution) to continue our collaboration.

What do we offer?

- Teaching opportunities in relevant courses;
- The post includes a two-year contract in Prague (i.e., 2024 and 2025) under competitive financial conditions;
- Training in using corpus methods in analysis.

Profile of an ideal candidate:

- Ph.D. degree in linguistics, corpus linguistics or Czech/Slavic studies (less than 5 years since graduation)
- Research interest and publication track record particularly in the field of linguistics and Slavic Studies
- Strong background in linguistics and Czech/Slavic studies
- Teaching experience is welcome
- Excellent knowledge of English (FCE equivalent or better)
- Strong research skills, creativity, motivation and ability to participate in large research networks
- Due to tax specification, the candidate cannot be employed in any other country than Czech Republic in course of the postdoctoral period

The applicants should submit:

- All documents required by the Charles University's Junior Fund
- Research proposal (max. 5 standard pages)
- Sample syllabi of two proposed courses/seminars

Salary: Equivalent to 2000 EUR/month
Workplace: Institute of Czech Studies (Faculty of Arts, Charles University): https://ubs.ff.cuni.cz/cs/
Supervisor: Mgr. Adrian Jan Zasina, Ph.D. (Head of the Institute)
Contact: adrian.zasina@ff.cuni.cz
Phone: +420 221 619 262

Position available from: January 1, 2024
Deadline for applications: July 9, 2023
Applicants must submit required documents to: adrian.zasina@ff.cuni.cz (project supervisior)

|2| Title of the research project:

	**GERMAN LITERATURE OF BOHEMIAN LANDS IN INTERCULTURAL AND SPATIAL PERSPECTIVE**

Description of the project:

Department of Germanic Studies is seeking a qualified post-doctoral researcher oriented towards high quality research in history of German literature and culture of the Bohemian Lands.
Research on German literature and culture in the Czech lands has recently gained new impulses thanks to the access to some important, previously unprocessed archival collections, the methodologically innovative potential of digital humanities and the application of current theoretical concepts of diverse provenances (intercultural theory; translation studies; field theory; network theory; media theory; postcolonial studies, regional studies or interdisciplinary Jewish studies). As a result, today's research moves out of the national philological models of literary and scientific history and is open to observing phenomena that only become apparent when looking at the context of the Central European cultural "melting pot". Understanding these historical phenomena contributes to the understanding of cultural clashes and processes of cultural balancing in the present.
The project is expected to focus on the topics that form part of aforementioned recent changes in theoretical reflection and overall design of this research area. The researcher is expected to publish at least one high-quality article in a database-indexed journal per academic year, actively collaborate with the researchers from the Kurt Krolop Centre for German Literature in Bohemia, and take part in teaching at the Department of Germanic Studies with one course per semester.

What do we offer?

- The post includes a two-year contract in Prague (i.e., 2024 and 2025) under competitive financial conditions;
- Participation in the ongoing projects of the Centre and the Department (including international jubilee conferences dedicated to Franz Kafka and R. M. Rilke);
- Teaching opportunities in relevant courses.

Profile of an ideal candidate:

- Completed Ph.D degree (max. 5 years since its award);
- Excellent command of German and English;
- Strong background in history of literature and culture of the Bohemian Lands and either literary sociology/comparative politics, or discourse analysis/cultural studies;
- Ability to carry out collaborative research;
- Teaching experience is welcome;
- (Due to tax specification, the candidate cannot be employed in any other country than the Czech Republic in course of the postdoctoral period.)

The applicants should submit:

- All documents required by the Charles University's Junior Fund
- Research proposal (max. 5 standard pages)
- Sample syllabus of one proposed course/seminar

Salary: Equivalent to 2000 EUR/month
Workplace: Department of Germanic Studies
Supervisor: Štěpán Zbytovský, Ph.D.
E-mail: stepan.zbytovsky@ff.cuni.cz
Phone:+420 221 619 244

Position available from: January 1, 2024 (for 24 months)

Deadline date for applications: July 16, 2023
Applicants must submit required documents to: stepan.zbytovsky@ff.cuni.cz

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|3| Title of the research project:

	**MEDIEVAL STUDIES**

Description of the project:
The Centre for the Study of the Middle Ages is seeking a highly qualified international post-doc researcher who would join the interdisciplinary team of medievalists at the Centre for two years. Any competitive topic in the field of Medieval Studies is welcome. In addition to pursuing his or her own research agenda, the researcher will take active part in the Centre?s endeavors. Based on his or her field, the researcher will be integrated into the relevant department of the Faculty of Arts, and will be expected to take part in the activities of the department, too.

What do we offer?

- The post includes a two-year contract in Prague (i.e., 2024 and 2025)
- Participation in the ongoing projects of the Centre for the Study of the Middle Ages (cuni.cz)
- Teaching opportunities in relevant courses
- Training in Digital Humanities connected to the project work

Profile of an ideal candidate:

- Ph.D. degree in field relevant for Medieval Studies such as medieval history, philosophy, literature and languages, latin studies, art history, archaeology, musicology etc. (less than 5 years since graduation)
- Research interest and publication track record
- Experience in Digital Humanities is welcome
- Teaching experience is welcome
- Excellent knowledge of English (FCE equivalent or better)
- Strong research skills, creativity, motivation and ability to participate in large research networks

Due to tax specification, the candidate cannot be employed in any other country than Czech Republic in course of the postdoctoral period.

The applicants should submit:

- All documents required by the Charles University's Junior Fund
- Research proposal (max. 5 standard pages)
- Sample syllabi of two proposed courses/seminars

Salary: Equivalent to 2,000 EUR/month
Workplace: Faculty of Arts
Supervisor: Prof. Mgr. Lucie Doležalová, Ph.D. / Doc. PhDr. Tomáš Klír, Ph.D.
E-mail: lucie.dolezalova@ff.cuni.cz
Phone: +420 605 758 079

Position available from: January 1, 2024 (for 24 months)

Deadline for applications: July 15, 2023
Applicants must submit required documents to: lucie.dolezalova@ff.cuni.cz and tomas.klir@ff.cuni.cz

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|4| Title of the research project:

	**IDEOLOGY AND ILUSIONS. RUSSIAN AND SOVIET IMPACT ON THE CZECH AND CZECHOSLOVAK CULTURE AND LITERATURE IN 19TH AND 20TH CENTURY**

Description of the project:

Institute of Czech and Comapartive Literature is seeking a qualified post-doctoral researcher oriented towards high quality research in the field of Czech and Comapartive Literture.

We list the postdoc's position out of the need to describe the newly Czech literary space in the complex coordinates of the historical tension between Slavic and German. This new description should be based on new archival research, both on the sources of Slavic emigration in Czechoslovakia between the wars and on research into the archives of the state security, irreplaceable for the period after the communist coup of 1948.
Nowadays, in order to understand Russian and Soviet influence in our country, it is necessary to describe the long shadows of ideologies and illusions, and especially illusions about our Slavicness and about Russia, which accompanied Czech literature and culture throughout the 19th and 20th centuries. In doing so, it is necessary to restore the distorted memory of non-Russian Slavic cultures and literatures. For such goals, it is necessary to turn to new methods and to current theoretical concepts of diverse provenances (intercultural theory; translation studies; field theory; network theory; media theory; postcolonial studies, regional studies). This is in accordance with the two lines of literary historical research of our institute, which focus on the culture of the 19th century and the first half of the 20th century, on the other hand, on the period after the communist takeover.

Requirements for the researcher: the researcher should be a comparatist, a Slavist who is fully Germanically oriented. He/she should be able to use the new possibilities of digital humanities. However, his/her focus should be primarily philosophical-aesthetic, sociological and literary-historical. The ability to work through ideologies as formative constructs

that have shaped cultures and its interpretation mainly in the long 19th century and the short 20th century is absolutely essential.

The researcher is expected to publish at least one high-quality article in a database journal per academic year, actively collaborate with the researchers from the sucesfull team of literary historians and take part in teaching at the Institute of Czech anad Comparative literature with one course per semester.

What do we offer?

• The post includes a two-year contract in Prague (i.e., 2024 and 2025) under competitive financial conditions;
• Participation in the ongoing projects of the Centre and the Department (including two international conferences dedicated to „Dmitro Čiževsky and Ukranian and Russian Emigration in Czechoslovakia and ist heritage“ and „Masculinities in Central Europe“);
• Teaching opportunities in relevant courses.

Profile of an ideal candidate:

• Completed Ph.D degree (max. 5 years since its award);
• Excellent command of German, Russian and English, good Czech and Slovak;
• Strong background in history of literature and culture of the Bohemian Lands and either literary sociology/ comparativeesthetics, or discourse analysis/cultural studies;
• Ability to carry out collaborative research;
• Teaching experience is welcome.

Due to tax specification, the candidate cannot be employed in any other country than Czech Republic in course of the postdoctoral period.

The applicants should submit:

• All documents required by the Charles University's Junior Fund
• Research proposal (max. 5 standard pages)
• Sample syllabus of one proposed course/seminar

Salary: Equivalent to 2000 EUR/month
Workplace: Institute of Czech and Comparative Literature
Contact: Doc. Mgr. Libuše Heczková, PhD.
E-mail: libuse.heczkova@ff.cuni.cz
Phone: +420 221 619 232
Position available from: January 1, 2024
Deadline for applications: July 16, 2023
Applicants must submit required documents to: libuse.heczkova@ff.cuni.cz

Faculty of Humanities

|1| Title of the research project:

	**VOLUNTEERING, VOLUNTARY CITIZEN ACTION AND CIVIL SOCIETY MOBILIZATION AT TIMES OF CRISIS**

The Department of Sociology at the Faculty of Humanities invites applications for a postdoctoral fellow in the research area of volunteering, voluntary citizen action and civil society mobilization at times of crisis.
During the Covid-19 pandemic, governments, citizens, nonprofit organizations and other social agents had to deal with an unprecedented situation. The ways societies and governments have handled the covid-19 pandemic are likely to have social, political and ethical impacts and may have become part of the new normality. Volunteering during the crisis has received immediate academic attention but the volunteer roles, the conflicting expectations and forms of volunteering during the pandemic (and during the war in Ukraine) have yet to be explored.
We invite research on the shifting meanings and practice of volunteering as voluntary unpaid work in the public sphere during societal crisis in general. Social expectation about volunteers' role and the meaning or value of their work are not well settled even in countries with long and uninterrupted traditions of volunteering, such as the UK or US. This uncertainty of meanings of volunteering is even more pronounced in countries such as the Czech Republic, where the present day tradition of formal organized volunteering has not started before mid-1990s.
The research may focus on volunteering in social and health care services during the pandemic, or on formal and informal voluntary unpaid help during the war in Ukraine, critical issues concerning the uses and abuses of volunteering by governments and nonprofit organizations etc., depending on the focus of the candidate.

An ideal candidate has a PhD in sociology, social policy, social work or cultural anthropology, excellent research skills and a proven ability to conduct research at a post-doctoral level and publish in international journals. Our department has an experience with Fullbright Fellows and we look forward to working together with a new colleague. Expected outcomes of the post-doctoral fellowship include one high-quality journal article (Jsc or Jimp), collaboration on a new research project with other members of the department, partial involvement in the training of doctoral or graduate students. We would also welcome if the candidate can enrich the international dimension of our faculty by co-organizing an international 1-day workshop in the area of her/his expertize.
Faculty: Faculty of Humanities
Department: Department of Sociology
Supervisor: doc. PhDr. Tereza Pospíšilová, Ph.D.
E-mail: tereza.pospisilova@fhs.cuni.cz
Deadline date: July 19, 2023
Position available from: January 1, 2024
Submit applications with all other documents to Research Administration Office: veda@fhs.cuni.cz (CC: tereza.pospisilova@fhs.cuni.cz)

|2| Title of the research project:

	**DEFINING HUMAN ORGASMS AND ORGASM DISORDERS**

Orgasm is a complex, multimodal reflex induced typically by genital stimulation and coming at the height of the sexual response cycle, prior to the inhibition that characterizes sexual refractoriness. Masters and Johnson originally described a singular orgasm pattern for men, but three distinct patterns for women. This result has been replicated using a variety of objective physiological measures. Mechanistically, genital stimulation activates excitatory neurochemical pathways in the brain and spinal cord that ultimately stimulate sympathetic outflow and the inhibition of parasympathetic spinal circuits in the lower lumbar cord to induce the feeling of release that characterizes climax (and ejaculation in males) from tonic spinal inhibition. At the same time, the conscious awareness of orgasm occurs as a rush of ecstatic pleasure due to the release of endogenous opioids in the brain, followed by a feeling of satiety and relaxation due to the release of serotonin and other neurochemicals. In men orgasm and climax are usually consonant with ejaculation, which is typically achieved by stimulation of the glans and shaft of the penis. In women, climax and orgasm are typically achieved by stimulation of the external glans of the clitoris. Some women can also achieve qualitatively different orgasms by stimulation of the internal bulbs and crux of clitoris and paraurethral glands (prostate) that are known collectively and colloquially as the “G-spot”. Orgasms can also be achieved by stimulation of the anterior cervix and even by intense stimulation of the nipples and other erogenous zones in sensitized individuals. Although the reflex is a product of “bottom-up” genitosensory stimulation, it is also controlled by “top-down” processing of excitation and inhibition that controls both the timing of parasympathetic and sympathetic blood flow, and the subjective ability to “let go” into the orgasm when it is imminent. Indeed, orgasms activate cortical, limbic, hypothalamic, and brainstem structures, and can be rated psychologically in terms of the perceived type and quality of sensory stimulation, affective experience, and the evaluation of pleasure. Orgasms are accompanied reliably by reflexive activation of pelvic floor muscles along with changes facial expressions and arm, leg, and toe flexions. This motor activation induces movement artifacts reflected in overall brain activation and patterns of electrical activity in the cortex that are difficult to control for. However, orgasms are also accompanied by neurochemical and endocrine changes that characterize both the euphoric state of pleasure and longer-term inhibition (refractoriness). Among these correlates is a consistent, orgasm-induced surge of prolactin released from the anterior pituitary into the peripheral bloodstream.

Among the sexual dysfunctions, orgasm disorders affect 25% to 40% of women and men, depending on age and sexual experience. These include anorgasmia, delayed ejaculation/orgasm, anhedonic orgasm (feeling of release without pleasure), and post-orgasmic illness syndrome (fever, illness, and inflammatory responses likely due to a high sensitivity to histamine released from mast cells at orgasm). Men can also experience early or rapid ejaculation that is under chronically disinhibited control. Most people with orgasm disorders experience moderate to intense distress, and the incidence of orgasm disorders increases with age. According to both the DSM-5 and the ICD-11, orgasm disorders can be lifelong or acquired, generalized or situational, and organic or multifactorial, with the latter being due to medications that can delay or abolish orgasm, like major tranquilizers, antihypertensives, opioid antagonists, anxiolytics, and antidepressants, especially the selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine. Indeed, because of their mechanism of action, SSRIs are often used off-label to treat rapid ejaculation. But despite growing knowledge, there are still many outstanding questions regarding orgasms: How can orgasms and orgasm disorders be detected objectively and subjectively in females and males? What are the differences between different orgasms obtained through different kinds of genitosensory or extragenital stimulation, or by masturbation versus sex with a partner? What are the effects of orgasm on both sexual and relationship satisfaction? And what contributes to the “orgasm gap” between females and males? These questions are at the forefront of sexual medicine today, and especially among sexual minorities.

We currently offer a Postdoc position where the candidate will focus on assessing the subjective role of orgasms in sexual and relationship satisfaction using standardized measures like the Orgasm Rating Scale of Mah and Binik, and the effect of orgasms on quality of sleep, using standardized sleep questionnaires in females and males without orgasm disorders, and in clinical populations of females and males with orgasm disorders. Data will be derived from both heteronormative cis-gendered individuals and from different sexual minorities within the LGBTIQA2+ communities. The candidate would also participate in the analysis of anonymized pelvic floor orgasm data from females using the Lioness biofeedback vibrator in an ongoing study, and from males using a new biofeedback tool being developed by Tenga. The candidate will work with these data in cooperation with the National Institute of Mental Health. She or he will also be expected to suggest and organize follow up studies.
Specific requirements set by the Department of Psychology and Life Sciences FHS UK:
We expect that our new research colleague will be able to work independently and will bring new experience and ideas to our team. She or he should have reasonable experience with the advanced techniques of quantitative and qualitative methods of psychology-related data obtained from questionnaires and psychophysiological measurements. Experience with the analysis of brain and hormonal samples is encouraged, as we will likely be assessing plasma prolactin in future studies.

Faculty: Faculty of Humanities
Department: Department of Psychology and Life Sciences
Supervisor: RNDr. James G. Pfaus, Ph.D.
E-mail: jim.pfaus@fhs.cuni.cz
Deadline date: July 19, 2023
Position available from: January 1, 2024

Submit applications with all other documents to Research Administration Office: veda@fhs.cuni.cz (CC: jim.pfaus@fhs.cuni.cz)

|3| Title of the research project:

	**THE ANTHROPOLOGY OF ARTIFICIAL INTELLIGENCE**

We invite applications for a postdoctoral researcher position specializing in the anthropology of artificial intelligence (AI) at the Faculty of Humanities, Charles University, located in the historic city of Prague. This position offers the opportunity to join a young, dynamic, and interdisciplinary team within the recently founded AI Institutional Transformation Research Group .
About the Field: The anthropology of AI is a burgeoning field within social-cultural anthropology that focuses on understanding the social and cultural dimensions of AI technology across diverse contexts. This interdisciplinary field blends qualitative research methods, particularly ethnography, with theories and perspectives from other disciplines, such as computer science, philosophy, or sociology.
Project Scope: The successful candidate will conduct a project to investigate the influence of AI on institutional transformations, focusing specifically on how AI systems shape social dynamics, power relations, and cultural practices within institutions. The project aims to provide in-depth analysis and empirical evidence of how AI technologies impact institutional frameworks. Ethical aspects of AI, such as fairness, transparency, and equitable distribution of benefits and risks, will be integral to this research.
Candidate Profile: We seek a candidate with a Ph.D. in social/cultural anthropology, ethnology, cultural studies, or sociology. The candidate should have a strong background in social/cultural anthropology and experience in anthropological fieldwork, including online and offline ethnography. Preferred specializations include digital anthropology and/or science and technology studies (STS), as demonstrated by a publication track record. A working knowledge of AI technology and its applications in various domains is expected. Previous teaching experience and excellent English skills are desired.
Benefits of the Position: As a member of our team, the postdoc will gain professional development opportunities, including publishing and presenting in high-profile venues and being involved in teaching activities (one course per semester). You will work in a collegial and supportive environment. We are an equal opportunity employer and strongly encourage applications from underrepresented groups in academia. We are committed to fostering a diverse and inclusive academic community.

Faculty: Faculty of Humanities
Department: Department of Social and Cultural Anthropology
Supervisor: Mgr. Martin Heřmanský, Ph.D.
E-mail: martin.hermansky@fhs.cuni.cz
Deadline date: July 19, 2023

Position available from: January 1, 2024

Submit applications with all other documents **to Research Administration Office**: veda@fhs.cuni.cz (CC: martin.hermansky@fhs.cuni.cz)

Faculty of Social Sciences

|1| Title of the research project:

	SETTING SUSTAINABLE DEVELOPMENT PRINCIPLES IN COMMUNICATION

Institute of Communication Studies and Journalism at Charles University seeks a post-doctoral candidate in the field of Sustainability and marketing communication. The candidate is expected to exhibit proven track-of-records linked to one of the following topics: Sustainability in business, marketing communication, and Sustainability. We are looking for an innovative scholar with the potential to bridge the divide between communication, business, and sustainability domains. The expected outcome of the fellowship is two journal articles (Jsc or Jimp) and involvement in the Ph.D. training. Upon further agreement, post-doctoral fellows will also have an opportunity to be involved in teaching.
Workplace: Institute of Communication Studies and Journalism (Faculty of Social Sciences, Charles University)
Supervisor: Ing. Petra Koudelková, Ph.D.
E-mail: petra.koudelkova@fsv.cuni.cz
Position available from: January 1, 2024 (24 months)
Deadline for applications: July 21, 2023
Applicants must submit required documents to: petra.koudelkova@fsv.cuni.cz

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|2| Title of the research project:

	INTERNATIONAL RELATIONS IN THE TIME OF UNCERTAINTY

During several previous decades, world politics rested on an evolving, but still rather persistent type of an international order. This order was to a large extent based on the dominant position of the United States (USA). Yet it also involved several important normative elements, represented by liberal principles, intensive global economic cooperation, or international institutions. To a high extent, the US-led order was sustained by the demand coming from the other states, which saw it as an enabling arrangement for dealing with global problems such the spread of weapons of mass destruction, terrorism, global economic crises, or environmental degradation.
At this moment, this order that has so far characterized international politics is facing several important challenges. One of the factors that weaken it is the changing distribution of power in the international system, marked by the decreasing position of the USA and the strengthening of the so-called rising powers. Furthermore, developing countries often hold different views about the appropriate form of international order, putting a greater emphasis on the principles of sovereignty and justice. Simultaneously, a part of the turbulent development can be attributed to social and ideological changes taking place in the developed countries. Last but not least, Russia's invasion of Ukraine challenges the basic respect for the principles of collective security.
Within this topic, we are searching for a post-doc candidate that would identify and explore an important issue that has to do with the contemporary transformative processes in international politics. The candidate should definitely dispose with a strong theoretical and methodological background. This background should enable him/her to contribute to the international academic debates. As for a concrete research topic, we are rather flexible. The concrete topic would need to be in some way connected with the changing characteristics of world politics. In this context, we welcome proposals that may deal with the cooperative, as well as conflictual aspects of world politics. In terms of issue areas, we are ready to consider proposals that may be concerned with security issues, international economic relations, or any other substantive field of the contemporary international relations.

Workplace: Institute of Political Studies (Faculty of Social Sciences, Charles University)
Supervisor: doc. PhDr. Jan Karlas, Ph.D.
Email: jan.karlas@fsv.cuni.cz
Position available from: January 1, 2024 (24 months)
Deadline for applications: July 21, 2023
Applicants must submit required documents to jan.karlas@fsv.cuni.cz

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|3| Title of the research project:

	DISINFORMATION, THE ROLE OF MEDIA AND AUDIENCES

Institute of Communication Studies and Journalism invites international post-docs to apply for a vacancy in journalism studies with an emphasis on the role of misinformation in the public space and its impact on the functioning of the media. The successful candidate will become part of a dynamic team working on the issue both in research (the team is currently focusing among other projects on the Horizon grant Resilient Media for Democracy in the Digital Age) and in teaching at the Department of Journalism. The topic is designed to link the role of media and audiences and focus on political communication, what role disinformation plays in contemporary democratic systems, and how modern liberal democracies can defend themselves.
Expected outcomes of the post-doctoral fellowship include:

- Two high-quality journal articles (Jimp)
- Involvement in the training of Ph.D. candidates
- Mutually enriching interaction with other members of the team

Upon further agreement, the post-doctoral fellow will also have an opportunity to be involved in teaching activities at the Department of Journalism.

Workplace: Institute of Communication Studies and Journalism (Faculty of Social Sciences, Charles University)
Supervisor: doc. PhDr. Alice Němcová Tejkalová, Ph.D.
E-mail: alice.tejkalova@fsv.cuni.cz
Position available from: January 1, 2024 (24 months)
Deadline for applications: July 21, 2023
Applicants must submit required documents to: alice.tejkalova@fsv.cuni.cz

Faculty of Mathematics and Physics

|1| Title of the research project:

	CALL FOR JUNIOR (POSTDOC) POSITION IN THE AREA OF ADVANCED TYPE SYSTEMS FOR REAL-WORLD PROGRAMMING

Post-doc position for two-year period from 1st January 2024

Applications are invited for a postdoc position at School of Mathematics, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic. The position is for two years starting from January 1, 2024.
Research Project
The growing importance of computer programs for economy, society and science makes it crucial to ensure that programs are constructed correctly and work as required. Static type systems are a popular and effective tool for writing robust and trustworthy programs. Despite being an active research area, there are many basic open research problems in the field. Static type systems could be used to assist programmers in a variety of different new ways, they could check for numerous kinds of currently unchecked errors, while their design could be simplified and made more uniform to support their implementation in real-world programming languages. The aim of the project is to advance the state-of-the-art of static type systems in one of several directions, including, but not limited to:
* How to design type systems for interactive programming environments, such as notebook systems, so that the static type can depend on previously computed values?
* How to use type systems that can guide code generation from large language models (LLMs) and ensure correctness of the generated code?
* How to unify the wide range of advanced type system mechanisms such as effect systems, coeffect systems, ownership types, linear and uniqueness types?
* How to pragmatically design usable static type systems that can check high-level logical constraints in areas such data science or low-code programming?

Workplace: Department of Distributed and Dependable Systems, Malá Strana, Malostranské nám. 2/25, Praha 1.
Contact person: Tomáš Petříček
E-mail: petricek@d3s.mff.cuni.cz
Position available from: January 1, 2024
Deadline date: July 15, 2023

Applicants should submit required documents **to:** petricek@d3s.mff.cuni.cz (project supervisor) and in a copy to ovzs@dekanat.mff.cuni.cz (faculty coordinator of the Junior Fund)

|2| Title of the research project:

	**CALL FOR JUNIOR (POSTDOC) POSITION IN THE AREA OF HADRON PHYSICS**

Post-doc position for two-year period from 1st January 2024
Applications are invited for a postdoc position at School of Mathematics, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic. The position is for two years starting from January 1, 2024.
Research Project
The structure of hadrons is encoded in the equations of QCD. However, fifty years after the discovery of quarks the theoretical calculations are just beginning to realistically describe their arrangement in hadrons. Precise experiments are necessary in this effort. The COMPASS experiment at CERN collected data on semi-inclusive deep-inelastic scattering of muons off hydrogen and off transversely polarised deuterons. The goal of our group is to analyse the data and extract the intrinsic transverse momentum and the polarisation of quarks of different flavours, aiming for a 3D mapping of the nucleon in the momentum space. The new AMBER collaboration will study the proton charge radius in muon-proton scattering and the structure of pions and kaons in Drell-Yan process using modified COMPASS spectrometer. For that, MC simulations and a new trigger-less data acquisition system with high-level data filtering are needed. The applicant is expected to contribute to these efforts at least half of the time, having the freedom to devote the rest to his/her own research interests in the field.
The applicants should have a Ph.D. degree in nuclear or particle physics or similar and experience with the analysis of data from a nuclear or particle physics experiment (not longer than 5 years). Expertise in hadron physics or data acquisition systems would be welcome. He/she cannot be the holder of the citizenship of the Czech Republic.
Workplace: Department of Low Temperature Physics, Faculty of Mathematics and Physics, Charles University, V Holešovičkách 747/2, Prague 8
Contact person: Jan Matoušek
E-mail: jan.matousek@mff.cuni.cz
Position available from: January 1, 2024
Deadline date: July 15, 2023
Applicants should submit required documents **to:** jan.matousek@mff.cuni.cz (project supervisor) and in a copy to ovzs@dekanat.mff.cuni.cz (faculty coordinator of the Junior Fund)

|3| Title of the research project:

	**CALL FOR JUNIOR (POSTDOC) POSITION IN THE AREA OF PURE AND APPLIED MATHEMATICS**

Post-doc position for two-year period from 1st January 2024
Applications are invited for a postdoc position at School of Mathematics, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic. The position is for two years starting from January 1, 2024.
We are looking for strong candidates in any area mathematics, including logic and algebra (broadly interpreted), number theory, geometry, harmonic analysis, functional analysis, ordinary and partial differential equations and dynamical systems, descriptive set theory, mathematical modelling, numerical analysis, high-performance computing, stochastics, econometrics, financial mathematics, machine learning/artificial intelligence with applications in continuum thermodynamics / theory of partial differential equations.
The candidate has to have PhD in the relevant area not longer than 5 years and he/she cannot be the holder of the citizenship of the Czech Republic.
Workplace: School of Mathematics, Faculty of Mathematics and Physics, Charles University, Sokolovská 83, Prague
Contact person: Pavla Kučerová
E-mail: kucerova@karlin.mff.cuni.cz
Position available from: January 1, 2024
Deadline date: July 15, 2023
Applicants should submit required documents **to:** kucerova@karlin.mff.cuni.cz (project supervisor) and in a copy to ovzs@dekanat.mff.cuni.cz (faculty coordinator of the Junior Fund)

|4| Title of the research project:

	**CALL FOR JUNIOR (POSTDOC) POSITION IN THE AREA: NOBLE LIQUID CALORIMETER FOR FUTURE CIRCULAR COLLIDER**

Post-doc position for two-year period from 1st January 2024
Applications are invited for a postdoc position at School of Mathematics, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic. The position is for two years starting from January 1, 2024.

Research Project
Future Circular Collider (FCC) [1] is a proposal for the next collider at CERN area after the LHC programme is over. The first stage of the project is the electron-positron collider FCC-ee. The R&D projects on the design of the detectors planned for the experiments at the FCC-ee have started recently. Our group is involved in the development of the high granular noble liquid calorimeter which is considered as an option for the electromagnetic calorimeter.
The noble liquid calorimeters have proved a very good performance in a number of experiments (e.g. D0, H1, NA48/62, ATLAS). The linearity and stability of the response, high resolution of energy measurement, very good position and timing resolution, particle identification capabilities and radiation hardness are the main advantages of the concept. A new design with finely segmented straight read-out electrodes allows for high segmentation which is one of the key requirements for the future calorimeters. The proposed calorimeter proved very good performance in Monte Carlo simulations for FCC-hh [2]. The calorimeter design has been optimised for the experiments at the FCC-ee [3]. Along with the detailed simulations, also first prototypes of read-out electrodes have been tested. Our group is involved in the studies of the design of the electrodes and the Monte Carlo simulations of the detector. The collection of the signal and its digitisation is to be simulated and optimised. Moreover, the candidate is expected to contribute to the software development, especially the implementation of the advanced reconstruction techniques (e.g. machine learning, particle flow). This is crucial for improving the performance of the high granular calorimeter.
We are looking for a candidate with experience in experimental particle physics, experience in calorimetry and software development is an advantage. The candidate will join our group working on noble liquid calorimetry for FCC. The work will include simulations of the signal digitisation needed for optimisation of the read-out chain and software development of the reconstruction algorithms in Key4HEP [4].
References:
[1] FCC Collaboration (2019), Future Circular Collider Study Volumes I – III, https://fcc-cdr.web.cern.ch.
[2] M. Aleksa et al (2019), Calorimeters for the FCC-hh, arXiv:1912.09962
[3] B. Francois (2022), Noble liquid calorimetry for a future FCC-ee experiment, https://doi.org/10.1016/j.nima.2022.167035
[4] G. Ganis, C. Helsens, V. Völkl (2021), Key4hep, a framework for future HEP experiments and its use in FCC, http://dx.doi.org/10.48550/ARXIV.2111.09874 .
Workplace: Department of Nuclear Physics and Nuclear Centrum, V Holešovičkách 747/2, 180 00 Prague 8
Contact person: Jana Faltová
E-mail: jana.faltova@mff.cuni.cz
Position available from: January 1, 2024
Deadline date: July 15, 2023
Applicants should submit required documents **to:** jana.faltova@mff.cuni.cz (project supervisor) and in a copy to ovzs@dekanat.mff.cuni.cz (faculty coordinator of the Junior Fund)

|5| Title of the research project:

	**CALL FOR JUNIOR (POSTDOC) POSITION IN THE AREA OF FUNDAMENTAL QUESTIONS OF DISCRETE GEOMETRY**

Post-doc position for two-year period from 1st January 2024

Applications are invited for a postdoc position at Department of Applied Mathematics, Charles University in Prague, Czech Republic.
Research Project
The project is focused on selected fundamental questions of discrete and computational geometry. These include questions around the Erdős-Szekeres Happy Ending theorem, on crossing numbers of graphs, visibility in Euclidean space, semialgebraic hypergraphs, and on Delauney graphs. The postdoc will work in a team consisting of senior and junior researchers and international postdocs, aiming at a crucial contribution to solution of fundamental problems in these areas.
We are looking for a highly qualified and motivated researcher with a strong publication record in impact journals and/or high-quality selective conference proceedings in the relevant area. The gender balance in the team shall also be taken into account.
Workplace: Department of Applied Mathematics
Contact person: Pavel Valtr
E-mail: valtr@kam.mff.cuni.cz
Position available from: January 1, 2024
Deadline date: July 15, 2023
Applicants should submit required documents **to:** valtr@kam.mff.cuni.cz (project supervisor) and in a copy to ovzs@dekanat.mff.cuni.cz (faculty coordinator of the Junior Fund)

Faculty of Science

|1| Title of the research project:

	**POPULATION AND STRUCTURAL GENOMICS OF CONVERGENT PLANT ADAPTATION**

We seek a highly motivated, independent early career researcher interested in joining a research program within the context of a high-competitive Starting ERC and Junior Star projects with a possibility to apply for further independent early-career projects. The successful candidate will join the interdisciplinary team of Ecological Genomics at Charles University in Prague, lead by Filip Kolář and will be integrated into a broad network of local and international collaborators.
Evolution is driven by a combination of deterministic forces and stochasticity, whose relative importance, however, remains a matter of debate. Knowing how predictable is evolution can provide insights into predictive evolution of crops, pathogens or species under climate change.
This project will address genomic basis and ecological consequences of convergent genome evolution in natural environments. By leveraging fascinating natural diversity of European Brassicaceae plants which repeatedly adapted to exceptionally strong selective pressure, toxic serpentine soils, the project aims at uncovering general mechanisms determining which portion of the genome evolves in a predictable manner. The successful candidate will use long-read sequencing data of multiple plant species to assembly novel references and identify structural variation. By integrating these findings with available short-read population-level genomic and transcriptomic data, they will identify convergent adaptive gene candidates and use comparative genomic approaches to infer the drivers of genomic convergence across species. The project builds on our previous research in natural *Arabidopsis* populations (e.g. Konečná et al. 2021, Bohutínská et al. 2021) but will extend well beyond this system in order to discern generality. Alongside the head-start with available data, the candidate is expected to be fully involved in the overall project design and will lead the analytical part of the project.
The candidate shall have (i) a keen interest in leading an independent research program within a collaborative research group, (ii) experience in handling large scale short- or long-read sequence data, (iii) a strong background in structural, statistical, and/or population genomics and (iv) PhD in evolutionary biology, genetics, bioinformatics, or related fields.
References
Konečná V, Bray S, Vlček J, Bohutínská M, Požárová D, Roy Choudhury R, Bollmann-Giolai A, Flis P, Salt DE, Parisod C, Yant L, Kolář F(2021): Parallel adaptation in an autopolyploid is dominated by repeated recruitment of shared alleles. – *Nature Communications.* doi:10.1038/s41467-021-25256-5
Bohutínská M, Vlček J, Yair S, Laenen B, Konečná V, Fracassetti M, Slotte T, Kolář F (2021): Genomic basis of parallel adaptation varies with divergence in Arabidopsis and its relatives. – *Proceedings of the National Academy of Sciences. doi:10.1073/pnas.2022713118.*
Salary: co-funding 1000 EUR/month is ensured
Co-founding resources: Starting ERC project Double Adapt
Department: Botany
Supervisor: Filip Kolář
E-mail: filip.kolar@natur.cuni.cz
Phone: +420 221 95 1638
Position available from: January 1, 2024
Deadline date for applications: July 25, 2023

Applicants must submit required documents **to:** filip.kolar@natur.cuni.cz (project supervisor) and in a copy to pavla.pouskova@natur.cuni.cz (International Department)

|2| Title of the research project:

	**THERMO-HYDRO-MECHANICS OF LANDSLIDES UNDER CLIMATE CHANGE: FROM LOCAL PROCESSES TO REGIONAL PATTERNS**

The frequency and severity of landslides is changing worldwide because of climate change. Landslides are complex phenomena, which involve hydro-mechanical processes in the ground in response to atmosphere-soil interaction. These processes are influenced by temperature, and laboratory experiments indeed show that the main soil parameters (shear strength, compressibility, hydraulic conductivity) are sensitive to even small variations (1–2 °C) in temperature. However, in temperate/warm climates (i.e., in non-freezing conditions), these thermal effects are not usually considered in slope stability models and, if they are, they are only related to hydrological and biological processes and not to soil mechanical behaviours. Consequently, the role of climate change in temperate/warm climates may be underestimated. This could be especially true for shallow (<10 m) landslides in clay soils – common in Europe (Czech Republic included) – as clays are especially sensitive to thermodynamic disturbances.
In this project, we will explore key aspects of temperature-dependent behaviours in soils and develop modelling strategies accordingly, to take these behaviours into account. We will work at multiple scales, through laboratory experiments under various thermal, hydraulic and mechanical conditions and through modelling at slope and regional

scales via both physically-based and data-driven approaches. Finally, we aim to propose a conceptual framework to evaluate whether observed (changes in) landslide patterns can be explained according to temperature-dependent processes observed at small scale.
More specifically, this fellowship is intended for a motivated postdoctoral candidate with expertise in spatial and spatio-temporal modelling of landslides and a solid understanding of physical processes responsible for landslide triggering and propagation. The fellow will be responsible for carrying out data-driven analyses (landslide susceptibility and hazard modelling) at the regional scale using a variety of methods rooted in geostatistics and machine learning. The analysis will focus on selected case studies in different climatic and lithological settings (e.g., in Central, Northern, and Southern Europe), with the goal of exploring the role of thermal forcing at different temporal scales (long-term warming, seasonal oscillations, short-term heatwaves) on different types of landslides (shallow vs. deep-seated, translational vs. rotational landslides, etc.) and learn how this combines with expected changes in precipitation patterns and land use. Special attention will be paid to the interpretability / explainability of the model results, the lack of which is a typical shortcoming in data-driven modelling. The fellow will explore novel AI-powered tools that are currently emerging, which aim at providing physical explainability to patterns identified in a purely data-driven manner. At the same time, the fellow will collaborate with other team members within the project who will be carrying out physically-based modelling at the slope and catchment scales for the same case studies as well as for virtual slope profiles, and will work on understanding whether and why the observed/predicted patterns are or are not consistent, thereby providing guidance on the upscalability/ downscalability of landslide modelling approaches.

Salary: co-founding 1000 EUR/month is ensured
Co-founding resources: ERC CZ project THALIS – Thermally induced instability of slopes under climate change (funds from MSMT, waiting for approval)
Department: Institute of Hydrogeology, Engineering Geology and Applied Geophysics
Supervisor: Gianvito Scaringi
E-mail: gianvito.scaringi@natur.cuni.cz
Phone: +420 777 546 432
Position available from: January 1, 2024
Deadline date for applications: July 25, 2023

Applicants must submit required documents **to:** gianvito.scaringi@natur.cuni.cz (project supervisor) and in a copy to pavla.pouskova@natur.cuni.cz (International Department)

|3| Title of the research project:

	**SYNTHESIS OF NOVEL CYCLIC POLYCATIONS FOR ENHANCED GENE DELIVERY AND ANTIMICROBIAL THERAPIES**

The ever-increasing threats of antibiotic resistance and the expanding needs for improved gene therapy techniques have urged researchers to explore new routes in polymer chemistry. This project aims to design and synthesize a series of novel cyclic polycations based on positively charged poly(2-oxazoline)s or polyethylene imine [1,2]. It is hypothesized that these innovative polymers, characterized by unique cyclic architectures and charge densities, can effectively perform in gene delivery applications and antimicrobial roles, potentially surpassing their linear chain counterparts.
Several synthetic strategies (such as cationic ring-opening polymerizations and subsequent post-polymerization modifications) will be utilized to yield cyclic polycations of different structures and cycle sizes, ensuring high cyclization yields. The synthesis will be designed to produce polymers of different charge densities and distributions, thereby allowing the study of structure-activity relationships. Both physical and chemical characteristics of the synthesized cyclic polymers will be analyzed. Methods like nuclear magnetic resonance spectroscopy (NMR), size-exclusion chromatography (GPC), matrix-assisted laser desorption/ionization (MALDI) mass spectroscopy, and dynamic light scattering (DLS) will be employed for the characterization. The solution properties of these polymers will be compared to their linear analogs to identify the benefits of cyclic architecture.
Selected cyclic polycations will be assessed for their antimicrobial properties against antibiotic-resistant bacteria (*e.g.*, S. Aureus). The effectiveness of these new structures will be compared to the linear analogs, potentially illuminating new pathways in the fight against antibiotic resistance. Furthermore, the cyclic polycations will be utilized to form polyplexes with nucleic acids. The resulting polyplexes will be studied for their potential in transfection, a key process in gene therapy. The efficacy of these new cyclic polymers for gene delivery will be compared to linear counterparts to evaluate their potential advantages.
This comprehensive project holds significant potential to advance our understanding of cyclic polycations, offering a unique perspective on their potential as effective antimicrobial agents and gene delivery systems. Ultimately, our findings may provide new avenues for the development of advanced materials in health sciences.
References:
[1] Zhou, Min, et al. *Angew. Chem. Int. Ed.* 59.16 (2020): 6412-6419.
[2] Cortez, Mallory A., et al. *J. Am. Chem. Soc.* 137.20 (2015): 6541-6549.
Salary: co-founding 1000 EUR/month is ensured

Co-founding resources: Group of Polymer synthesis and Biomaterials, Department of Physical and Macromolecular Chemistry
Department: Department of Physical and Macromolecular Chemistry, faculty of Science
Supervisor: Ondřej Sedláček, Ph.D.
E-mail: sedlacek@natur.cuni.cz
Phone: +420 221 951 311
Position available from: January 1, 2024
Deadline date for applications: July 25, 2023
Applicants must submit required documents **to:** sedlacek@natur.cuni.cz (project supervisor) and in a copy to pavla.pouskova@natur.cuni.cz (International Department)

|4| Title of the research project:

	**STRUCTURE AND ONTOGENY OF CYTOSKELETAL APPARATUS IN FREE-LIVING FLAGELLATE *PARATRIMASTIX PYRIFORMIS***

Flagellar motility is widely distributed among eukaryotes. It is characteristic of many protists and the sperm cells of most plants and animals. Eukaryotic flagella are formed by basal bodies (kinetosomes), which are cylindrical structures of nine microtubular triplets. Basal bodies (and the structurally similar centrioles) are highly conserved and thought to function as templates for the microtubular system of the axoneme. The basal bodies are attached to a set of cytoskeletal elements which together with the basal bodies form the flagellar basal apparatus (mastigont). The basal body-associated structures include microtubular flagellar roots, fibers interconnecting basal bodies or connecting them with the plasma membrane or the cell nucleus, and fibers extending into the cytosol.
At the end of the last century, excavate protists were recognized as a monophyletic group primarily due to similar morphological features. A typical excavate structure implies flagellate unicellular organisms with a feeding groove, a place on the surface of the cell that is used for food intake, supported by a specific architecture of microtubular roots and associated fibers. Shortly after the definition of this group, hypotheses contradicting the monophyletic nature of these protists were proposed. Thanks to the accumulation of data on the ultrastructure of the flagellate apparatus of different groups of excavates, as well as confirmation in molecular phylogeny, we now assume that excavates represent a paraphyletic group from which all other eukaryotes evolved. Given that excavates generally possess one of the most elaborated mastigont and cytoskeletal apparati among eukaryotes, the interpretation of its individual elements represents the basis for understanding the evolutionary history of the last common eukaryotic ancestor - LECA.
In the proposed project, we will investigate the structure and ontogeny of mastigont in *Paratrimastixpyriformis* (Metamonada), the model organism in our laboratory. *P.pyriformis* is a free-living species characterized by a typical excavate morphology, i.e., suspension feeding groove and four flagella of which one is directed anteriorly (or antero-laterally), one posteriorly, and others laterally. The posterior flagellum possesses two vanes with thickened vane margins. So far, no data are available on the cell division of species from this genus and the role of cytoskeletal elements in this process. Although the ultrastructure of *P. pyriformis* and its relatives has been investigated for the past few decades, we want to go a step further and investigate the details of the process of cell division and ontogeny of this cytoskeleton.
The aim of the project is to describe the process of cell division in *Paratrimastix pyriformis*, with emphasis on the flagellar apparatus roles of basal bodies and the inheritance of the cytoskeletal elements throughout the cycle. We will use antibodies staining alpha-tubulin to visualise microtubular roots and in-house produce antibodies against striated fiber (SF)-assemblin which specifically stains roots connected to the posterior basal body. Four types of microscopy will be applied: scanning electron microscopy, transmission electron microscopy, fluorescence microscopy and expansion microscopy. With scanning electron microscopy, the morphological aspect of cell division will be visualized, while transmission electron microscopy will be used for visualization and ultrastructural analysis of basal bodies and their associated microtubular elements in different phases of cell division. Special attention will be paid to expansion microscopy, a powerful super-resolution method that allows nanoscale imaging of specifically labelled biological specimens using conventional microscopes.
Salary: co-founding 1000 EUR/month is ensured
Co-founding resources: GACR 23-07277S
Department: Parasitology
Supervisor: Vladimír Hampl
E-mail: vlada@natur.cuni.cz
Phone: +420325873952
Position available from: January 1, 2024
Deadline date for applications: July 27, 2023

Applicants must submit required documents **to:** Vladimír Hampl (Project supervisor) and in a copy to pavla.pouskova@natur.cuni.cz (International Department)

|5| Title of the research project:

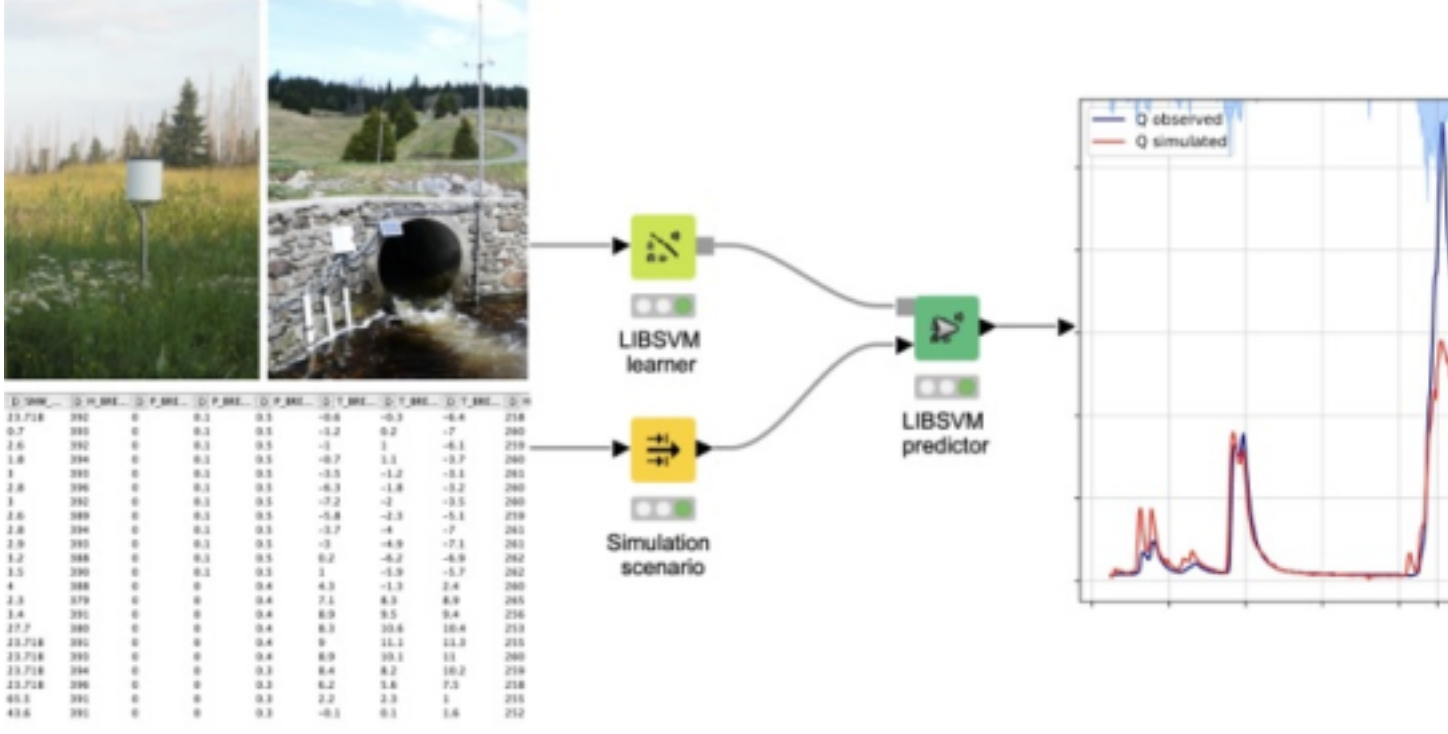
	MACHINE LEARNING FOR FLOOD AND DROUGHT MODELING UNDER CLIMATE CHANGE

The changing patterns of extreme hydrological and meteorological phenomena, such as floods and droughts, present significant challenges to both society and science. Accurately predicting and modeling these phenomena is crucial for effective disaster management, designing climate change adaptation strategies, and sustainable water resources management. The coupled effects of climate change with concurrent rapid landscape changes, such as forest disturbance, lead to increased uncertainty in hydrological predictions. In this field, the role of Machine Learning (ML) and Artificial Intelligence (AI) is emerging as promising approaches enabling us to more reliably simulate dynamic natural systems under changing boundary conditions, reducing uncertainties in predictions, and disentangling cross effects of principal driving forces of hydrological change.

The proposed research project aims to explore the potential and limitations of the use of Machine Learning (ML) models coupled with data from automated hydrometeorological sensor networks. Flood and drought modeling will be done on different spatial and temporal scales, using the network of experimental catchments in montane catchments, from event-scale to long-term perspective. Simulations will focus on hydrological extreme phenomena in mid-latitude montane basins, experiencing effects of climate warming, forest disturbance, or land use change, being a sensible indicator of hydrological change. Different ML algorithms will be employed, such as SVM, ANN, CNN, LSTM, or DL. Data from the sensor network in experimental catchments, comprising hydrological and meteorological monitoring at the high temporal resolution, combined with long-term observations at complex basins and supporting spatial data will be used as a basis.

We are seeking a highly motivated, independent, early-career researcher with a clear research vision and team spirit. The candidate should have a strong background in hydrology and/or geosciences, with a focus on hydrological modeling, hydroinformatics, and skills in machine learning and Python coding. Results of the candidate's independent research should be evidenced by relevant publications.

This project will be carried out under the supervision and mentoring of prof. Jakub Langhammer, and the candidate will be fully involved in the research activities of the Hydrology Research Group (http://hydro.natur.cuni.cz/) at Faculty of Science, Charles University. It is expected that the candidate will be involved in the ongoing research projects focusing on the hydrological impacts of climate change on peat and snow hydrology, as well as in the broader team activities, and will have the opportunity to collaborate with the partner team from the University of Zurich. We expect the candidate to publish results in high-quality hydrological journals such as Journal of Hydrology, Hydrology and Earth System Sciences, or Water Research.



Salary: co-founding 1000 EUR/month is ensured
Co-founding resources: Department of Physical Geography and Geoecology
Department: Department of Physical Geography and Geoecology
Supervisor: prof. RNDr. Jakub Langhammer, Ph.D.
E-mail: jakub.langhammer@natur.cuni.cz
Phone: +420 - 739 488 268

Position available from: January 1, 2024
Deadline date for applications: July 21, 2023
Applicants must submit required documents **to:** jakub.langhammer@natur.cuni.cz (project supervisor) and in a copy to pavla.pouskova@natur.cuni.cz (International Department)

|6| Title of the research project:

	**COMPUTATIONAL MODELLING OF LASER PULSE INDUCED ULTRAFAST DYNAMICS IN SINGLE-ATOM PHOTOCATALYSTS**

Photocatalysis is an emerging technology with great potential for addressing energy shortage and environmental pollution. Among the various types of photocatalysts, single-atom photocatalysts (SAPCs) have demonstrated high effeciency and remarkable activity owing to their unique spatial separation state, tunable coordination structure, and distinct local electronic properties. Gaining a comprehensive understanding of the ultrafast catalytic processes induced by light is essential for the rational design of photocatalysts, enabling enhanced photocatalytic performance and improved utilization of solar energy. In situ/operando characterization techniques, such as synchronous illumination X-ray photoelectron spectroscopy (XPS), provide valuable insights into the dynamic changes in the location, geometry, and electronic structures of single atoms and their interactions with the catalyst support during photocatalytic reactions. Additionally, these techniques offer crucial information for the development of highly efficient photocatalysts and the investigation of their underlying mechanisms.
Despite the progress made through experimental studies, the interpretation of these phenomena remains contentious. This is primarily attributed to the lack of ab initio understanding regarding the dynamics of light-induced ultrafast excited carriers and structural changes occurring at the single active site of photocatalysts. Bridging this gap between experimental observations and theoretical insights is crucial to advance our understanding and enable the rational design of high performance SAPCs. On the other hand, ab initio investigating light-driven ultrafast catalytic processes in photocalytic materials is still challenging due to the presence of phenomena such as ultrafast charge transfer, nonadiabatic electron-nuclei couplings, and the high computational cost.
This project aims to investigate the laser pulse induced ultrafast electronic and structural dynamics of SAPCs based on nanomaterials (such as 2D materials, oxides, or zeolites) for applications in water splitting and CO2 reduction at the microscopic scale. The research will employ state-of-the-art real-time time-dependent density functional theory (rt-TDDFT) and ab initio non-adiabatic molecular dynamics (NAMD) theory (surface hopping and Ehrenfest dynamics), to explore the ultrafast catalytic processes occurring in these SAPCs. Specifically, the project tasks will encompass:
(i) Mechanism elucidation of photoexcited carrier separation and recombination at active sites in SAPCs. (ii) Investigation of vibrational model excitation and bond dynamics for adsorbed molecules (such as CO2 or H2O). (iii) Examination of the dynamic evolution of the valence state and coordination environment during the photocatalytic reaction process. (iv) Analysis of the solid-liquid interaction of nanomaterials (with active sites) under photoexcitation. (v) Study of the effects of defects and catalyst supports on the ultrafast catalytic processes.
Publications of research group related to this topic:

1. J. He, S. Li, A. Bandyopadhyay, T. Frauenheim, Unravelling Photoinduced Interlayer Spin Transfer Dynamics in 2D Nonmagnetic-Ferromagnetic van der Waals Heterostructures, Nano Lett., 2021, 21, 3237-3244.
2. J. He, S. Li, L. Zhou, T. Frauenheim, Ultrafast Light-Induced Ferromagnetic State in Transition Metal Dichalcogenides Monolayers. J. Phys. Chem. Lett., 2022, 13, 2765-2771.
3. Z. Zhou, J. He, T. Frauenheim, O. V. Prezhdo, J. Wang, Control of Hot Carrier Cooling in Lead Halide Perovskites by Point Defects. J. Am. Chem. Soc., 2022, 144, 18126–18134.
4. S. Li, L. Zhou, T. Frauenheim, J. He, Light-Controlled Ultrafast Magnetic State Transition in Antiferromagnetic-ferromagnetic van der Waals Heterostructures. J. Phys. Chem. Lett., 2022, 13, 6223-6229.
5. J. He, T. Frauenheim, Optically driven ultrafast magnetic order transitions in two-dimensional ferrimagnetic MXenes. J. Phys. Chem. Lett., 2020, 11, 15, 6219–6226.

Qualifications:

A PhD degree in Computational Chemistry/Physics, Computational Materials Science or a related discipline is required, with experience in atomistic modelling of materials or first principles. Experience with programming is highly desired.
Salary: co-founding 1000 EUR/month is ensured
Co-founding resources: Department of physical and macromolecular chemistry budget
Department: Department of physical and macromolecular chemistry
Supervisor: Junjie He, Ph.D.
E-mail: junjie.he@natur.cuni.cz
Position available from: January 1, 2024
Deadline date for applications: 27th July, 2023

Applicants must submit required documents **to:** junjie.he@natur.cuni.cz (project supervisor) and in a copy to pavla.pouskova@natur.cuni.cz (International Department)

|7| Title of the research project:

	ANTIFUNGAL PRODRUGS THAT EVADE DRUG RESISTANCE

Invasive fungal infections are difficult to treat due to the increasing resistance of fungal species to current treatment and the limited number of available antifungal drugs.[1,2] In December 2022, World Health Organization (WHO) published the first list of priority fungal infections threatening public health.[3] Pathogenic fungi cause the most significant burden among susceptible individuals, e.g., immunocompromised, organ transplants, or cancer patients. Presence of fungal strains resistant to clinically used antifungals represents the biggest challenge of current decade.
Fungal pathogens use several mechanisms leading to drug resistance ranging from drug efflux to chromosomal duplication or target site mutation.[4,5] Moreover, resistant invasive mycoses can also develop secondary resistance in response to the current treatment.[6,7] Several species (e.g., *Aspergillus*) have reduced susceptibility to the currently used antifungal drugs resulting in pan-resistance. Prodruging current antifungal drugs overrides toxicity of drugs and drug resistance of fungal pathogens by circumventing common biological barriers, and consequently saves time and money in developing new chemical entities.

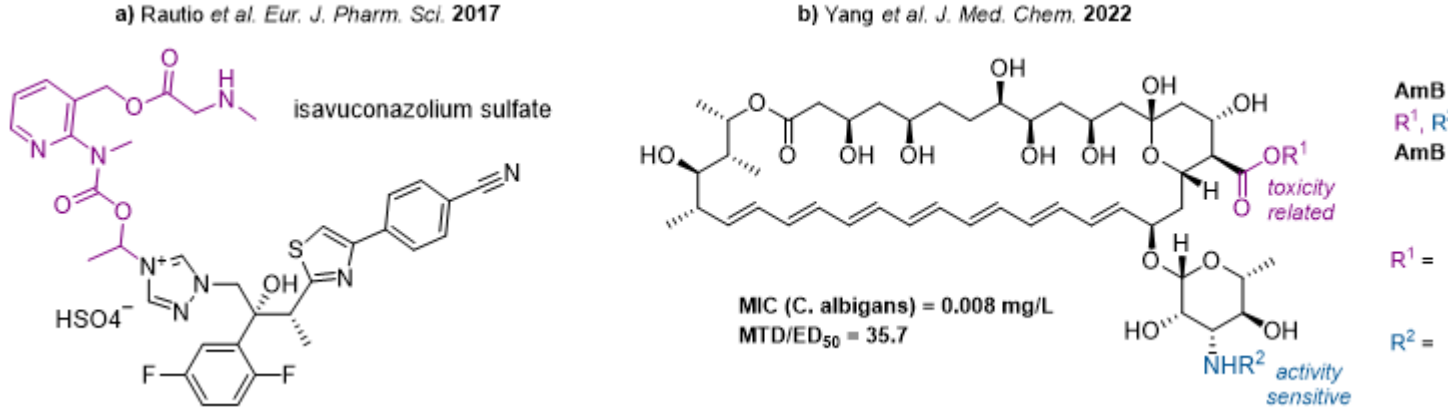


Figure 1. a) Isavuconazole prodrug (Isavuconazolium sulfate, active drug isavuconazole is released by activation through plasma esterases). **b)** Permanent modification of Amphotericin B (AmB) leads to less toxic antifungals, secondarily lowering drug resistance.

Aim of this proposal is the synthesis and development of non-targeted prodrugs of FDA-approved antifungal drugs to improve their pharmacokinetic properties, e.g., increasing solubility and lowering toxicity. The design of prodrugs will be part of the research (here, we built on our previous experience in the design of azole hybrids, prodrugs, and self-immolative linkers). The second part of the research project will be the design and synthesis of targeted prodrugs that are recognized specifically by fungal pathogens. The applicant should have good experience in both theoretical and practical organic chemistry.

References:
1) M. Hoenigl, R. Sprute, M. Egger, A. Arastehfar, O. A. Cornely, R. Krause, C. Lass-Flörl, J. Prattes, A. Spec, G. R. Thompson, N. Wiederhold, J. D. Jenks, *Drugs* 2021, *81*, 1703–1729.
2) W. Liu, L. Yuan, S. Wang, *J. Med. Chem.* 2020, *63*, 12429–12459.
3) "WHO fungal priority pathogens list to guide research, development and public health action," can be found under https://www.who.int/publications/i/item/9789240060241.
4) T. Y. Hargrove, L. Friggeri, Z. Wawrzak, A. Qi, W. J. Hoekstra, R. J. Schotzinger, J. D. York, F. Peter Guengerich, G. I. Lepesheva, *J. Biol. Chem.*2017, *292*, 6728–6743.
5) W. Chang, J. Liu, M. Zhang, H. Shi, S. Zheng, X. Jin, Y. Gao, S. Wang, A. Ji, H. Lou, *Nat. Commun.* 2018, *91*, 1–12.
6) L. W. Cheng, K. Land, *Pharm.* 2022, *15*, 482.
7) M. A. Ghannoum, Y. Fu, A. S. Ibrahim, L. A. Mortara, M. C. Shafiq, J. E. Edwards, R. S. Criddle, *Antimicrob. Agents Chemother.* 1995, *39*, 2459–2465.
8) a) P. Šimon, M. Tichotová, M. G. Gallardo, E. Procházková, O. Baszczyňski,*Chem. Eur. J.* 2021, *27*(50), 12763–12775. b) E. Procházková, P. Šimon, M. Straka, J. Filo, M. Májek, M. Cigáň, O. Baszczyňski, *Chem. Commun.* 2021, *57*, 211-214. c) O. Štěpánek, A. Čmoková, E. Procházková, V. Grobárová, J. Černý, M. Slapničková, A. Zíková, M. Kolařík, O. Baszczyňski, *ChemMedChem* 2022, e202200385.
Workplace: Department of Organic Chemistry, Faculty of Science, Charles University
Contact/supervisor: Ing. Ondřej Baszczyňski, Ph.D.
Email: ondrej.baszczynski@natur.cuni.cz

Position available from: January 1, 2024 (for 2 years)
Deadline date for applications: 25th July, 2023

Applicants must submit required documents **to:** ondrej.baszczynski@natur.cuni.cz (project supervisor) and in a copy to pavla.pouskova@natur.cuni.cz (International Department)

|8| Title of the research project:

	**EXPANDING OUR UNDERSTANDING ON THE MAJOR ASPECTS OF SEX CHROMOSOME EVOLUTION IN VERTEBRATES**

Recent genomic studies revealed a large variability of sex chromosomes in vertebrates, and challenged the role of previously assumed general evolutionary drivers and other aspects of the sex chromosome differentiation process. The long-term plan of the team is to expand our knowledge and clarify the role of sexual antagonism, repetitive elements, chromosome rearrangements, gene dose regulatory mechanisms and function of sex determining loci in the differentiation rate of sex chromosomes, and to test traditional and novel hypothesis in a comparative phylogenetic framework, examining vertebrate lineages that independently co-opted the same genomic regions for the role of sex chromosomes. The ideal candidate should have solid working knowledge on bioinformatics with emphasis in genomics, transcriptomics and/or proteomics analysis. Previous working experience with vertebrates or the evolution of sex chromosomes is important, but not mandatory.
Salary: co-founding 1000 EUR/month is ensured
Co-founding resources: GACR project 23-07347S
Department: Dept. of Ecology, Faculty of Science, Charles University
Supervisor: Michail Rovatsos
E-mail: rovatsom@natur.cuni.cz
Position available from: January 1, 2024
Deadline date for applications: 25th July, 2023

Applicants must submit required documents **to:** rovatsom@natur.cuni.cz (project supervisor) and in a copy to pavla.pouskova@natur.cuni.cz (International Department)

Faculty of Law

|1| Title of the research project:

	**LEGAL ASPECTS OF ARTIFICIAL INTELLIGENCE IN HEALTH CARE**

The introduction of artificial Intelligence to health care has a potential to disrupt and redefine the whole field. The variety of AI tools usable in health care is almost endless, from clinical decision support systems to image interpretation in radiology to the use of embodied AI in medical robotics (such as robotic surgery systems) to opening new horizons in telemedicine. At the same time, the legal and ethical issues are similarly immense and complex. The use of AI in health care is likely to represent one of the most pressing and discussed issues in law in the years to come, be it in the area of the human rights protection, standard of care, patient's autonomy of will and free informed consent, data protection, tort and criminal liability, or others. There will be a crucial need to analyse these problems in depth and propose options to address them. The post-doc researcher will narrow the scope of their research according to their interests and expertise.

Workplace: Department of Medical Law, Faculty of Law, Charles University
Contact/supervisor: doc. JUDr. Petr Šustek, Ph.D.
E-mail: sustek@prf.cuni.cz
Position available from: January 1, 2024
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** sustek@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|2| Title of the research project:

	**SECURITY INCIDENT IN THE HEALTH CARE SECTOR**

The digitisation of health care industry in connection with the problematic geopolitical situation in today's world emphasises the need to prepare for new security threats. Cybersecurity is going to be increasingly more important in the

context of health care, protecting not only health systems from extensive financial loss and other resource reduction, but also lives and health of patients. At the same time, data protection in the broader sense brings about new and complex challenges for the legislators, providers of health services, and other agents. Apart from these pressing issues in the digital world, the possibility of a physical attack on soft targets (especially patients and personnel in hospitals) is still all too real and requires effective and balanced response, which cannot be separated from the above-outlined problems of cybersecurity and data protection as well as the protection of other human rights. The post-doc researcher will analyse these problems from the theoretical and/or practical perspective of their choice.

Workplace: Department of Medical Law, Faculty of Law, Charles University
Contact/supervisor: doc. JUDr. Petr Šustek, Ph.D.
E-mail: sustek@prf.cuni.cz
Position available from: January 1, 2024
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** sustek@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|3| Title of the research project:

	**CHALLENGES FOR GOVERNANCE OF DISRUPTIVE TECHNOLOGIES IN PUBLIC LAW**

Emergence of disruptive technologies represents a considerable challenge for governance and for public law in various jurisdictions. The prospective post-doctoral fellow will address either challenges, arising for governance of one particular disruptive technology (for example artificial intelligence, FinTech, hydrogen technologies etc.), or a cross-cutting topic, covering several of these technologies (for example permitting scenarios, regulatory sandboxes etc.). The prospective post-doc fellow is expected to publish results of her/his research in journals, indexed in either WoS, or Scopus databases. Also, she/he is expected to present the outcomes of research at international conferences, seminars and workshops. A precise publication strategy will be a clear benefit in the application procedure.

Workplace: Department of Administrative Law and Administrative Science, Faculty of Law, Charles University
Contact/supervisor: Prof. JUDr. Jakub Handrlica, Ph.D., LL.M., DSc. handrlic@prf.cuni.cz
Position available from: January 1, 2024 (for 24 months)
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** handrlic@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|4| Title of the research project:

	**WATER LAW AND PROTECTION IN THE CZECH REPUBLIC AND ISRAEL (DE LEGE LATA AND DE LEGE FERENDA) IN THE INTERNATIONAL AND EUROPEAN CONTEXT**

The research and the final monograph should be focused on the problems with the protection of water (both quantity as well as quality) in the valid legal regulations of Czechia and Israel. Israel is taken as the world leader in the water management and its legal regulation. The problems of the floods and dry seasons are general problems caused especially by the climate change. The monograph should be concentrated on the question of the good practice and its inspiration from the Czech Republic and whole EU. Both aspects - mitigation as well as adaptation of the water management and treatment - should be taken in account. The results may even be some drafts for the Czech and European legislation and decision making.
Workplace: Department of Environmental Law, Law Faculty of the Charles University, Faculty of Law, Charles University
Contact/supervisor: Prof. JUDr. Milan Damohorský, DrSc., damohors@prf.cuni.cz
Position available from: January 1, 2024
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** damohors@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|5| Title of the research project:

	**CONVENTION AND ITS APPLICATION AND ENFORCEMENT IN CZECHIA AND UKRAINE FROM THE LEGAL POINT OF VIEW**

The research and the final monograph should be focused on the problems with the protection of forests, water, land, nature and landscape in the valid legal regulations of Czechia and Ukraine.
Both countries are the member parties of the Carpathian Convention (The Framework Convention on the Protection and Sustainable Development of the Carpathians), adopted in Kyiv (May 2003 - this year we have the 20. anniversary) together with five other countries of the region (Hungary, Slovakia, Poland, Serbia and Poland). Carpathian Convention is a good example of regional international cooperation of the sustainable development and management of one of the largest European mountain system (the total area of 190 000 km^2).
There are some troubles caused by climate change, bad forest management, tourism, water dry seasons etc. in the practice.
The monograph should be concentrated on the question of the good practice and its inspiration from the Czech Republic (western part of Carpathians Mountains) and Ukraine (the most eastern part of the Carpathian Mountains) and vice versa in Europe. Both aspects – legal regulation and its enforcement - should be taken in account. The results may be even some drafts for Ukraine (or vice versa) from the Czech and international law for its future legislation and decision making.

Workplace: Department of Environmental Law, Law Faculty of the Charles University, Faculty of Law, Charles University
Contact/supervisor: Prof. JUDr. Milan Damohorský, DrSc., damohors@prf.cuni.cz
Position available from: January 1, 2024
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** damohors@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|6| Title of the research project:

	THE CONFLICT IN UKRAINE AND TRANSITIONAL JUSTICE

The armed conflict in Ukraine, triggered by the acts of aggression of the Russian Federation against Ukraine, has brought about many violations of international law. There is a consensus among democratic States that those responsible for such violations must be held accountable and victims must be provided with adequate compensation. The criminal prosecution of perpetrators, both at the national and international level, other measures used within post-conflict settlement (vetting of individuals, etc.), as well as the ideal form of the compensation mechanism give however rise to many complex and complicated legal questions that are currently discussed by legal scholars and States alike. The task of the post-doc researcher would be to contribute to these discussions by carrying out high quality research of one or several of the institutions of transitional justice (to be) used with respect to the conflict in Ukraine.

Workplace: Department of Public International Law, Faculty of Law, Charles University
Contact/supervisor: Prof. JUDr. PhDr. Veronika Bílková, PhD., E.MA, bilkova@prf.cuni.cz
Position available from: January 1, 2023 (for 24 months)
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** bilkova@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|7| Title of the research project:

	CRISIS OF THE RULE OF LAW?

For more than a decade now, we have witnessed a serious rule of law backsliding in various countries of the world, including some of the EU members (especially Poland and Hungary). The process has revealed not only the insufficiency of the tools to counter the backsliding that the international community and its various actors (States, international organizations such as the EU) have at their disposal but also the lack of uniformity in the understanding of the rule of law concept. More prominently the concept features in the public and political space, less clear it is what it actually encompasses and how its state could be measured. The post-doc researcher will be expected to carry out original research related to the concept of the rule of law and its application with respect to the countries of Central and Eastern Europe.

Workplace: Department of Public International Law, Faculty of Law, Charles University
Contact/supervisor: Prof. JUDr. PhDr. Veronika Bílková, PhD., E.MA, bilkova@prf.cuni.cz
Position available from: January 1, 2023 (for 24 months)
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** bilkova@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|8| Title of the research project:

	**TAX FAIRNESS AND BUDGETARY DETERMINATION OF SHARED TAXES**

The topic deals with tax justice and the budgetary determination of shared taxes. The first part of the topic deals with both theoretical and practical aspects of the key element of fairness that should be reflected in practically all Czech tax law, especially in the area of income taxes. The research should focus on both horizontal and vertical tax justice. The second part of the topic is related to the preparation of an ideal model for the distribution of tax revenue between the individual public budgets. The main emphasis will be on the issue of tax sovereignty of municipalities and regions in relation to the model of fiscal federalism existing in the Czech Republic. Both parts of the topic are expected to be extensively compared with foreign legal systems in order to identify suitable concepts and models for the Czech legal environment.

Workplace: Department of Financial Law and Financial Science, Faculty of Law, Charles University
Contact/supervisor: JUDr. Petr Kotáb, Ph.D., kotabp@prf.cuni.cz
Position available from: January 1, 2023 (for 24 months)
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** kotabp@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|9| Title of the research project:

	**THE INFLUENCE OF DIGITALISATION ON BUSINESS ENTREPRENEURSHIP IN CENTRAL EUROPE**

Commercial law, especially the regulation of business and corporations, is currently affected by the massive wave of digitalization. A number of processes that are an integral part of business are moving from paper to digital.
An effort to eliminate the administrative burden, to strengthen cross-border activities and to increase the transparency and credibility of business, the registration of business authorisations, the formation of business corporations (in the spirit of the one-stop shop rule), the agenda of the business register, the legal actions and decisions of entrepreneurs and their bodies (e.g. decisions of general meetings) or reporting duties are regulated by a number of Member States at the instigation of the European Union, but also on their own initiative.
The aim of this joint research by a foreign post-doc and members of the department (primarily post-docs) is to analyse the effectiveness (mainly in relation to transaction costs incurred by entrepreneurs, but also by the state when implementing the rules) and the necessity of these digitisation rules and measures, especially in the Czech Republic and other Central European countries.

Workplace: Department of Business Law, Faculty of Law, Charles University
Contact/supervisor: doc. JUDr. Daniel Patěk, Ph.D., patek@prf.cuni.cz
Position available from: January 1, 2024 (for 24 months)
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** patek@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

|10| Title of the research project:

	**IMPLEMENTING SPECIFIC CORPORATE GOVERNANCE RULES FROM DEVELOPED MARKETS TOPOST-SOCIALIST MARKETS: DOES CORPORATE GOVERNANCE REALLY MATTER IN CENTRALEUROPE?**

The rules of good corporate governance, especially for public joint stock companies, are already, according to the perception of the doctrine, an integral and established part of corporate law. However, in Central Europe, especially in the post-socialist countries, the development, state and enforcement of these rules is miles behind such developed capital markets as the British, German and French markets. One of the main reasons why this is the case is the historical experience of investors (linked to so-called coupon privatisation in Czechoslovakia, Poland or Hungary) and the weakened confidence in capital markets. For this reason, a number of changes that have been or are to be implemented into corporate and capital market law, particularly at the instigation of the European Union, pose significant problems and cause numerous embarrassments. The soft law rules and the rules contained in the Corporate Governance Code also exhibit a number of specificities. On the other hand, it should be taken into account that the functioning of joint-stock

companies across legal systems, apart from established organisational differences, has a number of basically identical elements (such as the appearance of a principal-agent problem).
The aim of this joint research by a foreign post-doc and members of the department (primarily post-docs) is to analyse to what extent the rules transferred from developed capital markets to legal systems and best practices in post-socialist countries are implementable, feasible and functional. The project aims to assess whether the historical experience and specificities of post-socialist countries require a specific, idiosyncratic approach.

Workplace: Department of Business Law, Faculty of Law, Charles University
Contact/supervisor: doc. JUDr. Daniel Patěk, Ph.D., patek@prf.cuni.cz
Position available from: January 1, 2024 (for 24 months)
Deadline date for applications: July 17, 2023
Applicants must submit required documents **or queries to** patek@prf.cuni.cz (project supervisor) and in a copy to international@prf.cuni.cz .

Faculty of Medicine in Pilsen

|1| Title of the research project:

	**MITOCHONDRIAL BIOGENESIS AND MTDNA QUALITY IN OOCYTE AND EARLY EMBRYONIC DEVELOPMENT**

Input premise
There is mitochondrial inheritance down the maternal lineage and, therefore, the quality of oocyte mitochondria is crucial for the health of offspring. Mitochondrial biogenesis, including the balance of renewal and autophagy, the activity of mitochondria around fertilization, and the maintenance of mtDNA quality are still not understood. The project will simulate several risk factors (genetic burden, hormonal treatment, advanced maternal age) on transgene mouse strains. Oocytes and embryos will be isolated, mitochondrial capacity will be assessed, and the level of mtDNA polymorphism will be assessed. The knowledge of the sensitivity of oocytes to mtDNA mutations will provide evidence to human reproductive medicine and assisted reproduction.

Qualifications
• Ph.D.(orequivalent)degreeinlife sciences, max. 5 years from graduation
• Excellent English communication skills both in written and oral form
• Adequate publication activity
• Skills with gamete isolation and manipulation
• Perfect communicationand ability to work in a team
Department: Biomedical Center
Laboratory: Laboratory of Reproductive Medicine
Supervisor: Jan Nevoral
E-mail: jan.nevoral@lfp.cuni.cz
Phone: +420 377 593 808
https://orcid.org/0000-0002-2048-7325
About laboratory: http://biomedic-plzen.cz/en/404-laboratory-of-reproductive-medicine , https://twitter.com/_Repro_
Position available from: January 1, 2024
Deadline date for applications: July 16, 2023

Applicants must submit required documents **to** jan.nevoral@lfp.cuni.cz (project supervisor) and in a copy to Jitka.Skrabalova@lfp.cuni.cz .

|2| Title of the research project:

	**INJECTABLE HYDROGELS FOR CARTILAGE AND BONE TISSUE ENGINEERING**

Input premise
Bone tissue engineering, which uses a combination of living cells, bioactive molecules and three-dimensional porous scaffolds, represents a promising alternative to traditional medical methods to regenerate bone and cartilage tissue. Scaffolds can be applied either surgically by implantation of pre-prepared scaffold, or by injection of a solidifying precursor and cell mixture, or as an injectable prefabricated scaffold with seeded cells. In situ forming an injectable pre-fabricated scaffolds can be inserted directly into the defect site with a complex shape and critical size in a minimally invasive process. Injectable hydrogels in the form of 3D scaffolds have shown great potential due to their ability to

absorb significant amount of water, their high similarity to the natural extracellular matrix and their biocompatibility. The specific use of a hydrogel requires tailoring its properties to the environment where it becomes a carrier for cells and other substances important for their growth. Thanks to the combination of natural and synthetic polymers, their mechanical properties can be improved significantly. Tissue engineering could make an important turnaround in this treatment with 3D hydrogel scaffolds mimicking in vivo conditions. When a composite containing hydroxyapatite, an important component of calcified tissues, is prepared, the insufficient mechanical properties of the hydrogel are removed. The important properties of injectable hydrogels is gelation time, water absorption, degradation, mechanical strength, biocompatibility, cell binding, and their differentiation.
The research will be focused on synthesis of injectable composite hydrogel and its biocompatibility testing. The main aim is to prepared a hydrogel with a sufficient gelation time, mechanical properties and biocompatibility. This injectable material will be used as a matrix to verify the viability and differentiation of bone mesenchymal stem cells. he differentiation of these cells will be monitored based on the expression of selected osteodifferentiation genes. The resulting hydrogel matrix should serve to regenerate bone and cartilage tissue.

Qualifications
• Ph.D. (or equivalent) degree in biochemistry, macromolecular or organic chemistry, materials sciences, max. 5 years from graduation
• Excellent English communication skills both in written and oral form
• Working experience in a chemical laboratory, at least basic experience with cell molecular and cell biology
• Reliability, responsibility, conscientiousness, a willingness to learn new things, ability to work independently
• Experience in writing scientific publications, also as a first author (at least 2 publications) and at least 5 publications in journals with IF
• High motivation, ability to collaborate on research and publications
• Analytical thinking, ability to evaluate and interpret data

Department: Department of Medical Chemistry and Biochemistry
Supervisor: Ing. Petra Chocholatá, Ph.D.
E-mail: petra.chocholata@lfp.cuni.cz
Phone: +420 377 593 286
Position available from: January 1, 2024
Deadline date for applications: July 16, 2023

Applicants must submit required documents **to** petra.chocholata@lfp.cuni.cz (project supervisor) and in a copy to Jitka.Skrabalova@lfp.cuni.cz .

Faculty of Pharmacy in Hradec Králové

|1| Title of the research project:

	**INNOVATIVE APPLICATIONS OF CAPILLARY ELECTROPHORESIS IN PHARMACEUTICAL ANALYSIS**

The postdoc position is open for a motivated researcher in the field of analytical chemistry and advanced separation methods. The applicant will be mainly involved in the research that covers the application of capillary electrophoresis (CE) in pharmaceutical analysis.
Capillary electrophoresis in all separation modes represents very promising alternative to the conventionally applied chromatographic techniques, especially in the fields of chiral separations, pharmaceutical analysis, metabolomics, or proteomics. The wide spectrum of CE´s applicability is due to high flexibility of this separation technique, i.e., the composition of the separation medium can be changed by the addition of various modifiers to the background electrolyte resulting in the modification or tuning of separation selectivity.
The proposed project may be focused on various topics falling in the field of innovative CE applications in pharmaceutical analysis including but not limited to (i) the development of new chiral selectors such as chiral ionic liquids for CE enantioseparations, or (ii) application of CE-MS in the characterisation of drug purity and authenticity including the analysis of drugs of herbal origin or dietary supplements.

Candidate profile:
· Ph.D. degree in analytical chemistry.
· Skills to work in the analytical chemistry laboratory are desired.
· Strong background in capillary electrophoresis is desired (proved by relevant publication record).
· Good written and verbal communication skills in English.
· Knowledge of MS Office is a must.
· Experience with software such as ChemStation, MassHunter, GraphPad, and MODDE is a plus.

· Knowledge of mass spectrometry is a plus.
· Knowledge of design of experiments is a plus.
· Ability to work in an international environment.

Supervisor: PharmDr. Pavel Jáč, Ph.D. (ORCID: 0000-0002-8204-1177 ; web: Jáč Pavel | Vědecký portál - Farmaceutická fakulta UK (cuni.cz))
Email: jac_p9aa@faf.cuni.cz
Phone: +420 495 067 504
Position available from: 1st of January 2024
Deadline date for applications: 17th of July 2023
Applicants must submit all required documents including description of prior research, technical skills and scientific experience, to the project supervisor, PharmDr. Pavel Jáč, Ph.D. (jac_p9aa@faf.cuni.cz) and in the copy to faculty coordinator of the Junior Fund Bc. Karel Nohejl (nohejlk@faf.cuni.cz).

|2| Title of the research project:

	**COOPERATIVE CHALCOGEN BONDING CATALYSIS**

Description:
Chalcogen atoms can act as electrophilic or nucleophilic species based on their nature and substitution. Precise consideration of these characteristics allows for designing an on-goal targeted class of chiral organocatalysts. This project should focus on designing a cooperative type of organocatalysis that combines electrophilic and nucleophilic activation patterns within of novel organocatalyst developed in our laboratory.

Requirements for applicant:
- completed doctoral degree (Ph.D.) in the field of organic chemistry (experience with organocatalysis is advantageous),
- experience in the field of organic chemistry, especially in methodology development or total synthesis,
- active English skills (proficiency in spoken and written English),
- prerequisites for research work (patience, persistence, and passion towards long-term goals in research),
- flexibility, great diligence, thoroughness, and responsibility,
- good organizational and communication skills,
- ability to work both independently and in a team,
- high motivation and hardworking,
- strong willingness to learn new things continuously.

Salary: Co-funding is ensured and dependent on the candidate's proficiency/experience
Supervisor: Dr. Mgr. Ing. Tomas Hodik
Email: hodikt@faf.cuni.cz
Phone: +420 495 067 377
Workplace/Institution: Junior Research Group of Organic Synthesis & Catalysis, Charles University, Faculty of Pharmacy in Hradec Králové.
Position available from: January 1, 2024
Deadline date for applications: July 20, 2024.

Applicants must submit all required documents including description of prior research, technical skills and scientific experience, to the project supervisor, Dr. Mgr. Ing. Tomas Hodik (hodikt@faf.cuni.cz) and in the copy to faculty coordinator of the Junior Fund Bc. Karel Nohejl (nohejlk@faf.cuni.cz).