

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Fakulteta za matematiko in fiziko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Andrej Bauer, Andrej.Bauer@fmf.uni-lj.si

3. Raziskovalno področje (Research field):

matematika

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Raziskovalno delo sodi na področje logike in temeljev matematike. Raziskave se bodo posvetile razvoju tako imenovane sintetične matematike, v kateri z orodji iz logike, teorije tipov in teorije kategorij razvijemo formalne sisteme, ki imajo vgrajene bistvene sestavine izbranega področja matematike. Znani so primeri sintetičnega pristopa k diferencialni geometriji, teoriji domen, topologiji, izračunljivosti in algebraini geometriji. V raziskavah se bomo posvetili novemu področju, kot je na primer verjetnot s teorijo mere.

The research work falls within the field of logic and the foundations of mathematics. The focus will be on developing so-called synthetic mathematics, an approach in which we use tools from logic, type theory, and category theory to design formal systems that have built-in essential components of a chosen area of mathematics. Examples of the approach are already known in differential geometry, domain theory, topology, computability, and algebraic geometry. In this research, we will explore a new area, such as probability theory with measure theory.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

☐ **potrdilo o doseženi izobrazbi**

– Kandidat z zaključeno 2. stopnjo:

diplomska listina/potrdilo o zaključku študijskega programa (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)

priloga k diplomi/ potrdilo o opravljenih obveznostih (official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)

– Kandidat, ki še ni zaključil študija na 2. stopnji:

potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij (official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme)

☐ **nagrade** (awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))

☐ **bibliografija** (bibliography)

☐ **življenjepis** (CV)

☐ **motivacijsko pismo** (motivation letter)

☐ **opis dosedanjega sodelovanja pri raziskovalnem delu** (description of the candidate's research work)

☐ **osnutek idejne zasnove raziskovalnega dela** (preliminary research proposal)

☐ **priporočilno pismo** (letter of recommendation)

☐ **druge priloge** (*other attachments*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Fakulteta za matematiko in fiziko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Natan Osterman, natan.osterman@fmf.uni-lj.si

3. Raziskovalno področje (Research field):

Eksperimentalna fizika mehke snovi

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.: Kolektivno vedenje magnetnih nanoplošč v suspenziji: samosestavljanje in nastanek struktur pod vplivom zunanjih polj in tekočinskih tokov.

Eng.: Collective behavior of magnetic nanoplates in suspension: self-assembly and structure formation in external fields and flow conditions.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

- ☐ **diplomska listina/potrdilo o zaključku študijskega programa** (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)
- ☐ **priloga k diplomii/ potrdilo o opravljenih obveznostih** (official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)
- ☐ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme)
- ☐ **nagrade** (awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))
- ☐ **bibliografija** (bibliography)
- ☐ **življenjepis** (CV)
- ☐ **motivacijsko pismo** (motivation letter)
- ☐ **opis dosedanjega sodelovanja pri raziskovalnem delu** (description of the candidate's research work)
- ☐ **osnutek idejne zasnove raziskovalnega dela** (preliminary research proposal)
- ☐ **priporočilno pismo** (letter of recommendation)
- ☐ **druge priloge** (other attachments)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Fakulteta za matematiko in fiziko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Tomaž Prosen, tomaz.prosen@fmf.uni-lj.si

3. Raziskovalno področje (Research field):

teoretična fizika, statistična mehanika, matematična fizika

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.:

Mladi raziskovalec/raziskovalka (MR) bo obravnaval deterministične in stohastične celične avtomate na 2+1 dimenzionalnih prostorsko-časovnih mrežah. Poudarek bo na raziskovanju dinamike, časovno odvisnih pojavov, ter točnih rešitev – povezav s teorijo integrabilnosti. Integrabilni sistemi v 2+1 dimenzijah so še zelo neraziskano področje, MR naj bi v povezavi z ekstenzivnimi numeričnimi simulacijami, npr. korelacijskih funkcij, dinamičnih kvemčev, »fronte kaosa«, itn, poskusil predlagati preproste modele s točnimi rešitvami.

Pričakovano je dobro poznavanje programiranja v nizkonivojskem okolju (npr. C, C++, julia, etc) numeričnih metod ter konceptov iz teoretičnega računalništva (algoritmi in podatkovne strukture), ter analitičnih/matematičnih metod z uporabo v statistični mehaniki.

Eng.:

The young researcher (YR) will study deterministic and stochastic cellular automata on 2+1 dimensional spatio-temporal lattices. The focus will be on investigating dynamics, time-dependent phenomena, and exact solutions – connections with the theory of integrability. Integrable systems in 2+1 dimensions remain a largely unexplored field; the YR is expected, in connection with extensive numerical simulations (e.g., correlation functions, dynamical exponents, “chaos fronts,” etc.), to attempt to propose simple models with exact solutions.

A good knowledge of programming in low-level environments (e.g., C, C++, Julia, etc.), numerical methods, and concepts from theoretical computer science (algorithms and data structures), as well as analytical/mathematical methods used in statistical mechanics, is expected.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

☐ **potrdilo o doseženi izobrazbi**

– Kandidat z zaključeno 2. stopnjo:

diplomska listina/potrdilo o zaključku študijskega programa (*diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme*)

priloga k diplomi/ potrdilo o opravljenih obveznostih (*official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme*)

– Kandidat, ki še ni zaključil študija na 2. stopnji:

potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)

☐ **nagrade** (*awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award)*)

☐ **bibliografija** (*bibliography*)

☐ **življenjepis** (*CV*)

☐ **motivacijsko pismo** (*motivation letter*)

☐ **opis dosedanjega sodelovanja pri raziskovalnem delu** (*description of the candidate's research work*)

☐ **osnutek idejne zasnove raziskovalnega dela** (*preliminary research proposal*)

☐ **priporočilno pismo** (*letter of recommendation*)

☐ **druge priloge** (*other attachments*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Fakulteta za matematiko in fiziko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Andreja Šarlah, andreja.sarlah@fmf.uni-lj.si

3. Raziskovalno področje (Research field):

Specialna didaktika – Izobraževalna fizika (Special didactics – Physics education research)

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.: Raziskovanje učenja in poučevanja specifičnih tem fizike z na študenta osredinjenim pristopom

Mladi raziskovalec se bo v okviru doktorskega dela seznanil z raziskovalnimi izzivi na področju izobraževalne fizike. Ukvarjal se bo z raziskavami učenja in poučevanja specifičnih tem fizike z na dijaka oziroma študenta (v nadaljevanju študenta) osredinjenim pristopom. Kandidat bo proučeval, kako lahko na študenta osredinjen pristop preoblikuje učenje in poučevanje različnih fizikalnih vsebin in kako se pri študentih oblikuje znanje in razumevanje pojavov s specifičnega področja. Poudarek bo na raziskavah učenja in poučevanja aktualnih tem, kot so biofizika in fizika podnebnih sprememb, ali na razvoju in raziskavah učinkovitosti laboratorijskih vaj odprtega tipa pri pridobivanju znanja, razvoju kompetenc znanstvenega dela in odnosu do fizike in znanosti. Mladi raziskovalec bo deloval v skupini za izobraževalno fiziko UL FMF in sodeloval z drugimi doktorskimi študenti in strokovnjaki za poučevanje fizike ter njihovimi mednarodnimi partnerji iz Italije, Nemčije, Nizozemske, Švedske in ZDA. Pri delu bo sodeloval tudi z nekaterimi slovenskimi gimnazijami in fakultetami. Rezultati doktorskega dela bodo uporabljeni za izboljšanje poučevanja in učenja fizike ter izboljšanje našega razumevanja, kako se pri učenju gradi znanje in kako potekajo konceptualne spremembe.

Zaželen je magisterij iz fizike. Zaželene so tudi izkušnje z raziskavami v izobraževalni fiziki ali izobraževanju na splošno, predvsem pa navdušenje nad fiziko in pridobivanjem znanja. Zaželeno je znanje slovenskega jezika.

Eng.: Research of learning and teaching of specific topics in physics using student-centered approaches

The doctoral candidate will explore research challenges in physics education. The candidate will explore learning and teaching specific physics topics with student-centered approaches. The focus will be on how student-centered instruction can transform the learning and teaching of specific physics topics and how students develop knowledge and understanding of specific physical phenomena. In particular, the research will emphasize contemporary topics such as biophysics and the physics of climate change, or the development and evaluation of open-ended labs, assessing their effectiveness in knowledge acquisition, scientific skill development, and attitudes toward physics and science. The young researcher will work within the Physics Education Research Group at the UL FMF and collaborate with other doctoral candidates, physics education experts and their international partners from Italy, Germany, the Netherlands, Sweden, and the USA. They will also engage with Slovenian high schools and faculties. The research findings of the doctoral work will contribute to enhancing physics teaching and learning and improving our understanding of knowledge construction and conceptual changes in physics.

A master's degree in physics is preferred, along with experience in physics education research or education in general. Most importantly, the candidate should have a passion for physics and knowledge acquisition. Proficiency in Slovenian is desirable.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)

☒ **priloga k diplomii/ potrdilo o opravljenih obveznostih** (official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)

☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)

☒ **motivacijsko pismo** (*motivation letter*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Faculty of Mathematics and Physics

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Matija Vidmar, matija.vidmar@fmf.uni-lj.si

3. Raziskovalno področje (Research field):

Probability Theory

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.: Slučajni procesi in njihove posplošitve. Kandidat/ka ima solidno poznavanje stohastične analize, teorije martingalov, Brownovega gibanja in Poissonovih procesov. Tekoče obvlada angleščino.

Eng.: Stochastic processes and their generalizations. The candidate has a solid command of stochastic analysis, martingale theory, Brownian motion and Poisson processes. Fluency in English.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

- ☐ **diplomska listina/potrdilo o zaključku študijskega programa** (diploma certificate for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)
- ☐ **priloga k diplomii/ potrdilo o opravljenih obveznostih** (official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)
- ☐ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme)
- ☐ **življenjepis, ki vključuje morebitne relevantne znanstvene objave** (CV including relevant scientific publications, if any)
- ☐ **osnutek idejne zasnove raziskovalnega dela, če že obstoji** (preliminary research proposal, if any)
- ☐ **priporočilno pismo** (letter of recommendation)
- ☐ **potrdilo o znanju angleščine, če obstoji, ali izjava da je angleščina kandidatov/kin materni jezik** (certificate of proficiency in English, if any, or a statement that English is their mother tongue)