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SLOVESNA PODELITEV DIPLOM,  
MAGISTRSKIH DIPLOM IN  
PROMOCIJA DOKTORJEV ZNANOSTI  
UNIVERZE V NOVI GORICI

Dvorec Lanthieri, 31. maj 2018

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**Pozdravni nagovor**

*prof. dr. Danilo Zavrtanik, rektor*

**Podelitev diplom in magistrskih diplom Poslovno-tehniške fakultete**

*prof. dr. Tanja Urbančič, dekanja*

**Podelitev magistrskih diplom Fakultete za znanosti o okolju**

*prof. dr. Matjaž Valant, dekan*

**Podelitev diplom Fakultete za humanistiko**

*prof. dr. Aleš Vaupotič, dekan*

**Podelitev diplom Visoke šole za vinogradništvo in vinarstvo**

*prof. dr. Branka Mozetič Vodopivec, dekanja*

**Podelitev diplom in magistrskih diplom Akademije umetnosti**

*prof. Boštjan Potokar, dekan*

**Promocija doktorjev znanosti Fakultete za podiplomski študij**

*prof. dr. Danilo Zavrtanik, rektor*

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# Poslovno-tehniška fakulteta

## Študijski program prve stopnje Gospodarski inženiring

- **Ivan Krašna**; *mentor: predavatelj Silvester Vončina, univ. dipl. ekon.,*  
Povečanje ekonomičnosti poslovanja trsničarskih kmetij z optimizacijo stroškov davčnih obveznosti
- **Monika Krznar**; *mentor: viš. pred. mag. Iztok Lesjak,*  
Vpeljevanje sprememb v procese izbranega podjetja z analizo in predlogi izboljšav
- **Simon Majnik**; *mentor: prof. dr. Bojan Podgornik,*  
Priprava in izvedba preizkušanja v okviru razvoja novega drsnega obroča
- **Denis Batalić**; *mentorica: pred. Nadija Šuler, univ. dipl. prav.,*  
Učinkovitost ukrepov za spodbujanje zaposlovanja invalidov

## Študijski program druge stopnje Gospodarski inženiring

- **Gašper Puš**; *mentor: prof. dr. Bojan Podgornik,*  
Obračna odpornost orodnega jekla za delo v vročem
- **Boštjan Milič**; *mentor: prof. dr. Marko Bohanec,*  
Model vrednotenja primernosti kandidatov za delovna mesta v zdravstvenem domu

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## Fakulteta za znanosti o okolju

### Študijski program druge stopnje Okolje

- **Neža Orel;** *mentorica: prof. dr. Valentina Turk,*  
Odziv mikrobne združbe na mešanico nevarnih spojin
- **Nijat Rahimli;** *mentorica: doc. dr. Suzana Žižek,*  
Effects of potential climate changes on the behaviour, feeding rate and reproduction of selected soil invertebrates
- **Ana Karat;** *mentorica: doc. dr. Suzana Žižek,*  
Okoljska ocena tveganja fungicida folpeta za talne ekosisteme

## Fakulteta za humanistiko

### Študijski program prve stopnje Slovenistika

- **Neža Šuligoj;** *mentorica: prof. dr. Katja Mihurko Poniž,*  
Osebnost Cirila Kosmača v njegovih literarnih delih, literarnozgodovinskih pregledih, študijah in spominih

### Študijski program prve stopnje Kulturna zgodovina

- **Tjaša Petrič;** *mentor: doc. dr. Željko Oset,*  
Slovenska osamosvojitvena vojna v Vipavski dolini – spomini in pričevanja pripadnikov teritorialne obrambe

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# Visoka šola za vinogradništvo in vinarstvo

## Študijski program prve stopnje Vinogradništvo in vinarstvo

- **Uroš Špacapan:** *mentorja: prof. dr. Branka Mozetič Vodopivec in mag. Marko Lesica,*  
Vpliv različnih bentonitov na senzorične in kemijske lastnosti vina sorte 'Rebula' (*Vitis vinifera* L.)
- **Aljaž Namar:** *mentorja: doc. dr. Melita Sternad Lemut in prof. dr. Paolo Sivilotti,*  
Vpliv odstranjevanja listov in uporabe mrež za zaščito pred ptiči na količino pridelka ter kakovostne parametre grozdja in vina sorte 'Sauvignonasse' (*Vitis vinifera* L.)

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# Akademija umetnosti

## Študijski program prve stopnje Digitalne umetnosti in prakse

- **Vida Habjanič**; *mentorja: prof. Rado Likon in prof. Jasna Hribernik*,  
Naslov teme praktičnega dela: Svojljni zaimki  
Naslov teme teoretičnega dela: Godard, Coutard in Svojljni zaimki
- **Mateja Nikolić**; *mentorja: Miha Colner in prof. Jasna Hribernik*,  
Naslov teme praktičnega dela: *Bajke*  
Naslov teme teoretičnega dela: *Magični realizem v filmih Wesa Andersona in Emirja Kusturice*

## Študijski program druge stopnje Medijske umetnosti in prakse

- **Inga Mijatović**; *mentorja: prof. dr. Peter Purg in doc. dr. Mitja Reichenberg*,  
Naslov teme praktičnega dela: #feelcolor  
Naslov teme teoretičnega dela: Vpliv barv na dojemanje in doživljanje
- **Dunja Danial**; *mentorica: prof. Jasna Hribernik*,  
Naslov teme praktičnega dela: Odpadki druge generacije – po stopinjah nekega punka, dokumentarni film  
Naslov teme teoretičnega dela: Odpadki druge generacije – po stopinjah nekega punka, nastanek avtorskega dokumentarnega filma
- **Helene Thümmel**; *mentorja: prof. Tomislav Brajnović in prof. dr. Peter Purg*,  
Naslov teme praktičnega dela: *Preveč slavnostnih večerij*  
Naslov teme teoretičnega dela: *Srečanja in obsedenosti v sodobnem mestu*

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# Fakulteta za podiplomski študij

## Promocija doktorjev znanosti

### Študijski program Humanistika (tretja stopnja)

- **Mitja Trojar**; *mentor: prof. dr. Kozma Ahačič*,  
Development of Slovenian linguistic terminology in Slovenian grammars in the 18th and 19th centuries

Doktorska disertacija Mitja Trojarja *Razvoj slovenske jezikoslovne terminologije v slovenskih slovnica* v 18. in 19. stoletju se ukvarja s splošnimi problemi metajezika in jezikoslovne terminologije, s problematiko teoretične ustreznosti tradicionalne (wüsterjanske) terminologije in z razvojem slovenske jezikoslovne terminologije v slovnica slovenskega jezika v 18. in 19. stoletju.

V disertaciji nam avtor predstavi posebnosti znanstvenega in neznanstvenega metajezika, pri čemer posebno pozornost posveti avtonimiji in opiše posebnosti avtonimov v slovenskem jeziku. Ukvarja se tudi z vprašanjem, katere so tiste značilnosti jezikoslovja, po katerih se loči od vseh drugih znanosti.

Umestitvi Eugena Wüsterja, ki velja za utemeljitelja tradicionalne terminologije, v zgodovinski kontekst sledi analiza njegovih temeljnih besedil. V njej uspe avtor pokazati, kako kompleksen je ključni koncept Wüsterjeve terminologije – pojem *pojem*, ter osvetli zgodovinske in druge okoliščine, ki so bistveno določale Wüsterjev pogled na terminologijo.

Avtor skuša nato kritično preveriti teorijo pojmov, ki jo vsebuje tradicionalna terminologija: gre za klasično teorijo pojmov. Pri tem izpostavlja problematičnost klasične definicije (definicije *per genus et differentiam*): takšne definicije so v jezikoslovju (slovnica) redke. Če namreč takšne definicije ni ali pa je niti ni mogoče oblikovati, tradicionalna terminologija ne zna pojasniti, kako se med seboj primerjajo pojmi v različnih teorijah (npr. različnih slovnica) oz. kako poteka prevajanje terminov.

Na koncu doktorata je predstavljen je prispevek izbranih slovenskih slovnica 18. in 19. stoletja k razvoju slovenske jezikoslovne terminologije. Ugotovljeno je, da je bil pri uvažanju novih terminov najvplivnejši slovníčar Anton Janežič, saj jih je od 50 pregledanih

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terminov v svojih dveh slovnica h uvedel kar 27.

Disertacija nakazuje tudi nekatera opažanja o semantiki jezikoslovnih terminov: ker so intenzijske (klasične) definicije v slovnica h redke, je v disertaciji podan predlog, da k semantiki termina ne prispevajo le intenzijske (abstrahirane) informacije, pač pa tudi avtonimi in sam termin (označevalec).

*Mitja Trojar's PhD thesis entitled Development of Slovenian linguistic terminology in Slovenian grammars in the 18th and 19th centuries deals with general problems of metalanguage and linguistic terminology, with theoretical adequacy of traditional (Wüsterian) terminology and with the development of Slovenian linguistic terminology in Slovenian grammars from the 18th and 19th centuries.*

*The dissertation presents peculiarities of scientific and non-scientific metalanguage, devotes special attention to autonymy and describes special features of autonoms in Slovenian. It also approaches the question which are those features that distinguish linguistics from all other scientific disciplines.*

*Eugen Wüster, who is considered to be the founder of traditional terminology, is put into historical context, which is followed by an analysis of his fundamental texts. In this analysis, the author succeeds in showing how complex the basic concept of Wüster's terminology – the concept concept – really is and sheds light on historical and other circumstances that largely determined Wüster's view of terminology.*

*The author then critically assesses the concept theory contained within traditional terminology, i.e. the classical theory of concepts. The problems of classical definition (definition per genus et differentiam) are emphasized: in linguistics (grammars), such definitions are rare. If no such definition is available or if it is not even possible to form it, then traditional terminology is unable to explain how concepts in different theories (e.g. different grammars) are compared and how translation of terms takes place.*

*The end of the thesis presents an analysis of the contribution of selected Slovenian grammars from the 18th and 19th centuries to the development of Slovenian linguistic terminology. It is established that the most influential grammarian as far as introduction of new terms is concerned is Anton Janežič, since in his grammars he introduced 27 out of 50 the terms in question.*

*The PhD thesis also contains some remarks about the semantics of linguistic terms: since intensional (classical) definitions are rarely found in grammars, the author suggests that the meaning of the term is composed not only of intensional (abstracted) information, but also of autonoms and the term (signifier) itself.*



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## Študijski program Znanosti o okolju (tretja stopnja)

- **Aleksandar Šobot**; mentor: prof. dr. Andrej A. Lukšič,

The Impact of Europeanisation on the Nature Protection System of Selected Countries of Southeast Europe on the Example of the Establishment of Multi-Level Governance System of Natura 2000

Evropeizacija označuje proces prilagajanja in je značilen za tiste države, ki so želele vstopiti v EU; za to so morale prilagoditi svoje politike, pravni red in izvesti institucionalne popravke. Področje naravovarstva in okoljevarstva ni bilo izvzeto. Kolikor je politična ekologija sploh proizvajala raziskave, bile so redke, so bile predvsem usmerjene na politično (policy) in na normativno raven, ne pa tudi na vzpostavljanje novega institucionalnega sistema (polity in politics). Ta premik v predmetu raziskovanja je naredil Aleksandar Šobot na področju Nature 2000; raziskoval je strukturne in sistemske pogoje, v katerih so se policy, normativni in institucionalni premiki dogajali; rezultati raziskave so ga pripeljali do uvida, da so politične, družbene in civilnodružbene strukture v določeni politični skupnosti ter njihova medsebojna razmerja, ki so obstajala pred procesom evropeizacije, določujoča za način delovanja, njihovo politično moč in iniciativnost; tam, kjer so bile razvite in strokovno podkovane okoljske nevladne organizacije, so te imele pomembno vlogo pri določanju teritorija Nature 2000 in tudi pri njeni institucionalizaciji; torej so bile nosilke evropeizacije; tam, kjer pa so umanjale civilna družba ni imela pomembnega vpliva na proces evropeizacije, proces je potekal od zgoraj navzdol, nosilke pa so bile države in njene institucije. Na primeru Nature 2000 v Sloveniji, Hrvaški in Bosni in Hercegovini je proces evropeizacije potekal s podporo različnih akterjev v ospredju in zato na različne načine, kar vodi do relativizacije teorije evropeizacije na področju Nature 2000, saj ta ne more več dojemati procesa evropeizacije kot državo-centričnega, pač pa vanj odločilno vstopa hotenje civilnodružbenih in strokovnih organizacij. Aleksander Šobot opozori še na nadaljnjo pot normativnega, institucionalnega in programskega razvoja Nature 2000 v vsaki od omenjenih držav.

*Europeanization refers to the process of adjustment that is characteristic of the countries that wanted to enter the EU and which therefore had to adjust their policies and legal order, as well as carry out institutional corrections. The field of nature and environmental protection was not exempt from this. As far as political ecology produced any research, it was rare and primarily*

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*directed at the policy and normative level, and not at the establishment of a new institutional system (policy and politics). Such a move as regards research was made by Aleksandar Šobot in the Natura 2000 field; he carried out research on the structural and systemic conditions under which policy, normative, and institutional changes occurred. The results of his research lead to the conclusion that in a given political community political, social, and civil society structures as well as their mutual interrelations that had existed before the process of Europeanization determine the manner of their functioning, their political power, and their level of initiative. Where expert non-governmental environmental organisations had developed, they played an important role in determining the Natura 2000 area, as well in its institutionalisation, thus they were the bearers of Europeanization. However, in the areas where they were not present, civil society did not have a significant impact on the process of Europeanization, rather this process occurred vertically, in a top-down manner, with the bearers being the states and their institutions. In the case of Natura 2000 in Slovenia, Croatia, and Bosnia and Herzegovina, the process of Europeanization was carried out with the support of various actors at the forefront, and therefore in different ways this has resulted in the relativization of the theory of Europeanization in the Natura 2000 field, as the latter can no longer consider the process of Europeanization to be state-centric, but instead it is being decisively driven by the objectives of civil society and expert organisations. Furthermore, Aleksander Šobot calls attention to the further development of Natura 2000 on the normative, institutional, and programme levels in each of the above-mentioned countries.*

## Študijski program Molekularna genetika in biotehnologija (tretja stopnja)

- **Sree Gowrinadh Javvadi**; *mentor: dr. Vittorio Venturi*,  
Signaling studies in the emerging kiwifruit pathogen *Pseudomonas syringae*  
*pv. actinidiae*

Sree Gowrinadh Javvadi je po opravljenem magisteriju iz biotehnologije na Jawaharlal Nehru Technological University v Indiji dobil štipendijo Arturo Falaschi Fellowship za doktorsko raziskovalno delo v Laboratoriju za bakteriologijo na ICGEB v Trstu. Njegovo raziskovalno delo je bilo osredotočeno na iskanje novih molekul medvrstnega

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signaliziranja (quorum sensing) pri patogenu kivija *Pseudomonas syringae* pv. *actinidiae* (PSA). Zgodnje študije metabolomike so pripeljale do odkritja celotnega zunajceličnega metabolomskega profila patogena PSA. Presenetljiva je njegova detekcija azelaične kisline, ki je bila do sedaj znana le kot rastlinska molekula z ključno vlogo pri aktivaciji rastlinskih obrambnih mehanizmov. Prisotnost azelaične kisline v supernatantu kulture PSA je potrdil z različnimi metodami analitske kemije. Dokazal je, da so patovari *Pseudomonas syringae* sposobni produkcije azelaične kisline, zlasti v prisotnosti saharoze. Kljub temu so njegove kasnejše raziskave so pokazale, da azelaična kislina zelo verjetno ni medvrstna signalna molekula in ni vpletena v quorum sensing. Opravil je tudi nekatere raziskave katabolizma azelaične kisline na sevu *Pseudomonas nitroreducens* DSM 9128, ki lahko azelaično kislino uporablja kot edini vir ogljika in energije. Raziskovalno delo Sree Gowrinadh Javvadi je prvi dokaz o bakterijskem izvoru azelaične kisline in odpira zanimiva vprašanja o pomenu te molekule v medvrstnem signaliziranju na modelu rastlinskih patogenov *P. syringae*.

*Sree Gowrinadh Javvadi graduated with a Master's degree in Biochemistry from the University of Jawaharlal Nehru Technological University, India, joined our laboratory in October, 2014 to pursue PhD studies. He secured Arturo Falaschi Fellowship from ICGEB, Trieste, Italy. Prior to joining our laboratory he gained research experience in Plant-Microbe interactions from a Government of India owned laboratory, CDFD Centered at Hyderabad, India.*

*Mr. Javvadi's work focused on detecting a possible novel quorum sensing signaling molecules in *Pseudomonas syringae* pv. *actinidiae* (PSA), a kiwifruit pathogen. Initial studies with a metabolomics approach enabled Mr. Javvadi to establish the total extracellular metabolome profile of PSA. Surprisingly, he identified a nine carbon dicarboxylic acid namely azelaic acid, so far reported of plant origin and having key role in priming defense responses as a mobile signal. He carried out his studies to confirm the presence of azelaic acid in the PSA spent supernatant by structural elucidation using various techniques of analytical chemistry. He concluded the *Pseudomonas syringae* pathovars are capable of producing azelaic acid, especially when grown in the presence of sucrose. His further studies to test whether azelaic acid behaves as a quorum sensing molecule however showed that azelaic is most likely not an intraspecies signaling molecule. He also performed studies on the catabolism of azelaic acid using the strain *Pseudomonas nitroreducens* DSM 9128 which can utilize azelaic acid as sole source of carbon and energy. Collectively, his studies for the first time report bacterial origin of azelaic acid and laid the path for further investigation to test the possible role of azelaic acid in inter-kingdom signaling in the model *P. syringae* plant pathogens.*

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- **Katarzyna Rajkowska**; *mentor: dr. Franco Pagani*,

Modified U1 RNAs as splicing correctors in human genetic disorders

Katarzyna Rajkowska je raziskovalno delov okviru doktorske naloge opravila v Laboratoriju za humano molekularno genetiko na ICGEB v Trstu. Preučevala je terapevtsko aktivnost novega razreda malih molekul RNA z imenom eksonsko specifične RNA U1 (U1 RNAs), ki popravljajo napake v procesiranju molekul RNA (RNA splicing). Ta pristop je uporabila na modelu družinske disavtonomije, ki je redka neozdravljiva bolezen, pri kateri zaradi napak v procesiranju RNA pride do napredujoče degeneracije senzoričnega in avtonomnega živčnega sistema. Raziskovalno delo je pričela s proučevanjem molekularnih mehanizmov nastanka bolezni. Pri tem je odkrila ključni proteinski dejavnik, ki uravnava število napak pri procesiranju RNA. Na osnovi teh rezultatov je identificirala najučinkovitejše molekule male RNA, ki jih je potem uporabila za testiranje njihove terapevtske učinkovitosti na modelu celic bolnikov. Ugotovila je, da je na ta način mogoče odpraviti nepravilno procesiranje RNA, zaradi česar bolnikove celice spet sintetizirajo delujoči protein. Zelo pomembna je njena ugotovitev, da vektorski sistemi na osnovi adenovirusov zelo učinkovito dostavijo terapevtske molekule male RNA na tarčno mesto. V modelnem sistemu transgenih miši je bilo na ta način mogoče popraviti neustrezni vzorec procesiranja RNA v več različnih tkivih in izboljšati sintezo neokvarjenega proteina.

V doktorskem raziskovalnem delu je tako Katarzyna Rajkowska odkrila nove regulatorne dejavnike, ki so vključeni v napake pri procesiranju molekul RNA. Pokazala je tudi, da je genska terapija in vivo z aktivnimi molekulami RNA ena izmed potencialnih novih strategij za zdravljenje družinske disavtonomije.

*Katarzyna Rajkowska performed her PhD studies in the Human Molecular Genetic Lab exploring the therapeutic activity of a novel class of small RNA-based molecules named Exon Specific U1 RNAs that are able to correct splicing defects. She applied this strategy to Familial Dysautonomia, a rare disorder with no curative treatment caused by a splicing defect and characterized by progressive degeneration of the sensory and autonomic nervous system. She started her work studying the molecular mechanism involved and in this initial analysis she identified the key protein factors that regulate the severity of the splicing defect. Based on this data, and in particular on those factors that aggravate the defect, she identified the most active RNA molecules. These best performing small RNAs were then explored for their*

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*therapeutic activity in patients derived cells and the results showed a complete rescue of the splicing defect and improvement in corresponding protein. Most importantly, she showed that the delivery of the small RNAs using adeno-associated vectors into a transgenic mouse model corrected the aberrant splicing patterns in several tissues increasing the amount of the corresponding protein. All together the studies performed by Katarzyna Rajkowska during her PhD identify novel regulatory factors involved in the splicing defect and provide the proof of principle that the active molecules delivered in vivo by adeno-associated vectors represent a novel therapeutic strategy for Familial Dysautonomia.*

## Študijski program Krasoslovje (tretja stopnja)

- **Peter Kozel**; mentorja: prof. dr. Tanja Pipan in prof. dr. Tone Novak,  
Ecological evaluation of aquatic and terrestrial subterranean fauna in a karst cave

V doktorski disertaciji je Peter Kozel sočasno ekološko proučeval vodno in kopensko podzemeljsko favno v Zgubi jami blizu Postojne. Doslej take študije še niso opravili; raziskovalci so ločeno obravnavali ali vodno ali kopensko favno. V svoji pilotni raziskavi je kandidat eno leto z mesečnimi vzorčenji zbiral podatke o osnovnih abiotičnih dejavnikih ter o obeh favnah za primerjalno analizo. Vodno favno je vzorčil v curkih prenikle vode, kopensko pa s pregledovanjem vseh dostopnih kopenskih mikrohabitatov in z izpopolnjeno metodo talnih pasti. Raziskal je časovno ter prostorsko dinamiko stigobiontov in troglobiontov v prenikli vodi in troglobionte, troglofile in trogloksene v terestričnih habitatih ter ugotavljal, kateri okoljski dejavniki najbolj vplivajo na njihovo prisotnost in abundanco. Potrdil je, da vrstno pestra troglobiontska favna iz curkov domnevno sobiva z vodno favno v deloma z vodo zaliti epikraški coni. Odkril je značilen prostorski vzorec v abundanci in prisotnosti troglobiontov, ki se med letnimi časi spreminja v odvisnosti od okoljskih dejavnikov v jami. Dinamika večine troglofilov in trogloksenov je posledica njihovih migracij med površjem in jamo. V sklopu raziskave je izpopolnil metodo lova s talnimi pastmi, ki se je v primerjavi s klasično uporabo teh pasti izkazala kot učinkovitejša in precej manj invazivna. To lahko bistveno prispeva k manj invazivni inventarizaciji kopenske podzemeljske favne v prihodnje ter s tem k bolj smotrnemu načrtovanju spremljanja stanja favne v podzemeljskih habitatih. Izkazalo se je, da sta dinamiki vodne in kopenske favne

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v jami na letni ravni deloma primerljivi, vendar bi bilo za posplošitev sklepov nujno potrebno opraviti dolgoročne raziskave.

*In his thesis, Peter Kozel dealt with simultaneous ecological evaluation of aquatic and terrestrial fauna in a cave Zguba jama near Postojna. Such study has not been performed so far as researchers have dealt with only aquatic or only terrestrial fauna separately. In this pilot study, in monthly sampling over one year, he acquired data on environmental parameters and both faunas, in order to make comparative analysis. Aquatic fauna was sampled from water drips of percolation water, while terrestrial fauna by visual inspection of all available terrestrial microhabitats within the cave and optimized baited pitfall trapping. He studied temporal and spatial dynamics of stygobionts and troglobionts in percolating water, and troglobionts, troglaphiles and troglaxenes in terrestrial habitats, paying special attention to the question which environmental parameters influence mostly their presence and abundance. In percolation water, species-rich troglaphobiotic fauna was recorded as well, which most probably coexist with aquatic species in a semi-aquatic epikarst environment. He found a distinctive spatial distribution pattern of troglaphobionts dependent on seasonally changing environmental conditions. The temporal dynamics of most troglaphiles and troglaxenes reflected their migration between the surface and the cave. His optimized pitfall trapping method turned out more efficient and less invasive with respect to the classical pitfall trapping. This novel approach enables less invasive inventory of terrestrial subterranean fauna and more suitable planning of monitoring terrestrial fauna in subterranean habitats. He found out that the dynamics of stygobionts and troglaphobionts within the cave showed partly comparable annual patterns. However, long-term studies should be performed prior to making any overall conclusions. Results of his study were already published in two, highly ranked peer-review scientific journals.*

- **Petra Kovač Konrad;** mentorja: izr. prof. dr. Franci Gabrovšek in doc. dr. Nenad Buzjak, Speleogenetic factors and processes in the karst conduits of Zagorska Mrežnica spring cave (Croatia)

Delo obravnava kras in jame epifreatične in freatične cone Ogulinskega Zagorja (Hrvaška), ki jih je avtorica s sodelavci intenzivno raziskovala zadnjih deset let. Samo v Izviru Zagorske Mrežnice pri vasi Desmerice so raziskali 1334 m potopljenih rovov. V celotnem obdobju so v več kot 500 urah jamskih potopov raziskali skupaj 3,5 km potoplje-

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nih rogov v sedmih jamah. Kraško zaledje jam se napaja skozi niz ponorov v zalednih kraških poljih in preko razpršene infiltracije na vrtačastem površju Velike Kapele. Glavni cilj raziskave je bil določiti dejavnike razvoja jam in aktivne procese v freatičnih pogojih. V ta namen je avtorica razvila nove metode podvodnega kartiranja presekov rogov, drobnih skalnih oblik in strukturnih elementov. Študija je vsebovala številne analize sedimentov, petrološke analize vzorcev, kemične analize voda in analize hidroloških pogojev pred in po izgradnji akumulacijskega jezera Sabljaci. Izdelanih je bilo 48 presekov rogov in 3D model celotnega jamskega sistema. Narejena je bila karta ranljivosti kraškega območja. Rezultati raziskav so pokazali, da je razporeditev in usmerjenost jamskih kanalov v veliki meri strukturno pogojena. V morfologiji kanalov je zapisanih več ciklov epifreatičnih in freatičnih faz razvoja ter paragenetskega preoblikovanja. Sestava sedimentov v veliki meri ustreza litologiji zbirnega območja; zrna so slabo zaobljena, kar kaže na relativno kratek transport. Na osnovi 3D modela in geomorfoloških analiz, je avtorica ugotavljala povezave med razvojem jam in lokalnim oz. regionalnim razvojem površja ter o povezavi razvoja Izvira Zagorske Mrežnice in jame Zagorska Peč.

*The karst of Ogulinsko Zagorje area (Croatia) and its epiphreatic and phreatic cave systems have been intensively explored for the last eight years. Over 500 hours of diving resulted in more than 3.5 km of explored submerged passages in seven caves. Among them, Zagorska Mrežnica Spring Cave (1334 m) is the longest. The karst drainage system has elements of point recharge through a set of ponors in the hinterland karst poljes and diffuse infiltration through numerous dolines on Velika Kapela Mountain. The goal of the research was to determine speleogenetic factors and processes in phreatic conditions. A new methodology for mapping of cave cross-sections, micro-relief forms, and structural elements was developed. Sediment analyses, petrographic analyses and hydrochemical analyses of water were made, as well as analyses of spring discharge before and after construction of the accumulation lake Sabljaci. 48 cross-sections of the cave passages and a 3D model of the cave system were created. The results showed that geological structure plays the main role in the distribution of cave passages. The morphology of the cave passages shows a transition between epiphreatic (possibly vadose) and phreatic phases, and phases of paragenetic development. The sediment mineralogy coincides with the lithology of the catchment area and therefore indicates its local origin. A 3D model reveals relations between the evolution of the cave systems and the landscape evolution, as well as a possible connection with the nearby Zagorska Peč cave.*

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## Študijski program Fizika (tretja stopnja)

- **Rizwan Zahoor**; mentor: prof. dr. Božidar Šarler,  
Simulation of gas focused liquid jets

Disertacija obsega razvoj eksperimentalno verificiranega numeričnega modela ter računalniško simulacijo mikronskega, plinsko fokusiranega kapljevitega curka, proizvedenega s pomočjo brizgane plinsko dinamične virtualne šobe. Kapljeviti mikro-curki se uporabljajo za dostavo kristalnih proteinskih vzorcev v žarek trde rentgenske svetlobe v serijskih femtosekundnih kristalografskih eksperimentih. Karakteristike curka so analizirane kot funkcije procesnih parametrov, geometrije ter tipa fokusirnega plina.

Fizikalni model je opisan s formulacijo mešanice in Navier-Stokesovimi enačbami za Newtonske, dvo-fazne, neustaljene, stisljive tokove v osni simetriji. Problem večfaznega toka je rešen z metodo končnih volumnov, kjer je stik med tekočinama opisan z metodo prostornine tekočine.

Rezultati simulacij so primerjani z eksperimentalnimi rezultati glede na debelino in dolžino curka destilirane vode, usmerjenega s helijem, ki se stekata v nizkotlačno komoro. Opaženo je dokaj dobro ujemanje z eksperimentalnimi podatki ter velikostno analizo za območje nikoli prej obravnavanih parametrov delovanja šob.

Nato je bila izvedena numerična študija vpliva različnih geometrij šobe na stabilnost, obliko in karakteristiko toka mikronskega kapljevitega curka. Značilnosti curka so opisane kot funkcija razdalje med kapilaro in odprtino, premera izhodne odprtine šobe in kota dovodne kapilare.

Enak numerični model je uporabljen tudi za analizo delovanja curka zaradi vpliva usmerjevalnih plinov argon, ogljikov dioksid in dušik. Študija kaže, da z uporabo helija pri istem masnem pretoku, dosežemo dvojno dolžino curka v primerjavi s preostalimi plini.

Pridobljene so bile nove pomembne informacije za nadaljnje projektiranje plinsko fokusiranih mikroskih šob.

*The dissertation copes with development of an experimentally verified numerical model and simulation of micron-sized, gas focused liquid jet, produced by an injection molded gas dynamic virtual nozzle. Liquid micro-jets are used for delivery of protein crystal samples in a hard X-ray beam in serial femtosecond crystallography experiments. The jet characteristics are analyzed as a function of operating parameters, geometry and focusing gas type.*



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*The physical model is described by mixture formulation and Navier-Stokes equations for transient, Newtonian, two-phase, compressible flow in axisymmetry. Multiphase flow problem is solved with finite volume method, where fluid-fluid interface tracking is obtained with volume of fluid method.*

*The simulations are compared with experimental results according to the jet thickness and length for distilled water jet and helium focusing gas, discharging into low-pressure environment. A reasonably good agreement with experimental and scaling results is found for the range of nozzle operating parameters never tackled before*

*Subsequently, a numerical study of effects of nozzle geometry on stability, shape and flow characteristics of micron-sized liquid jets is performed. The jet characteristics are described as a function of capillary-to-orifice distance, nozzle outlet orifice diameter and liquid feeding capillary angle.*

*The same numerical model is used to analyze also the jet performance under the influence of argon, carbon dioxide and nitrogen focusing gases. The study shows that helium gas at the same mass flow rate provides twice the length of the jet compared to other gases.*

*Valuable new information was obtained for the design of micron sized gas-focused nozzles.*