

Kratek opis usposabljanja mladega raziskovalca (*Short description of the Young Researcher's training*)

1. Raziskovalna organizacija (*Research organisation*):

Univerza v Ljubljani, Fakulteta za matematiko in fiziko

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

Miha Ravnik, (miha.ravnik@fmf.uni-lj.si)

3. Šifra in naziv raziskovalnega področja (*Research field*):

1.02 Fizika

4. Kratek opis usposabljanja mladega raziskovalca (*Short description of the Young Researcher's training*):

Navedite tudi morebitne druge zahteve, vezane na usposabljanje mladega raziskovalca (npr. znanje angleškega jezika, izkušnje z laboratorijskim delom, potrebne licence za usposabljanje...).

slo:

Mladi raziskovalec bo delal na temi topološke fotonike v mehki snovi. Osrednji izziv in ideja bo s teoretskimi in modelskimi pristopi raziskati topološka stanja svetlobe, kot se jih lahko ustvari z mikro-manipulacijo fotonih materialov lastnosti, posebej dvolomnostjo v kompleksnih tekočinah. Metodološko bomo razvili pristop za opis lastnih stanj v kompleksnih dvolomnih sistemih in nadalje preučili svetlobne mehanizme, ki bi omogočili topološko zaščitena svetlobna stanja. Nadalje bomo študirali dvolomne profile oziroma strukture ter njihovo morebitno dinamiko v različnih geometrijah, ki lahko vodijo do topološke kontrole svetlobe. Pri tem bo zanimivo razumeti in karakterizirati pripadajoče lastne načine svetlobe, ki pričakujemo, da bodo kompleksno prostorsko odvisni in to tako intenzitetno kot tudi po smeri. Opisane teme bodo pričakovano vodile do znanstvenih objav, predstavitev na mednarodnih konferencah in eventuelno aplikativnih dosežkov. Delo bo potekalo v Skupini za fiziko mehkih in delno urejenih snovi (<http://softmatter.fmf.uni-lj.si>) na FMF UL pod mentorstvom doc. dr. M. Ravnika (<http://miha.ravnik.si>). Delo bo stalno vpeto tudi v znanstvena sodelovanja z eksperimentalnimi skupinami v Sloveniji in tujini, ki delajo na povezanih vsebinah. V sklepu zapišimo, da je predlagana tematika ambiciozen fundamentalni in aplikativni znanstveni izziv na svetovnem nivoju, ki lahko vodi do zanimivih novih optičnih materialov in fotonih mehanizmov na osnovi povezave konceptov topologije in materialne anizotropije.

eng:

The young researcher will work on the topic of topological photonics in soft matter. The key challenge and idea of the work will be to explore theoretically and with modelling the topological states of light as created with micro-manipulation of photonic material properties, especially with birefringence in complex fluids. Methodologically, we will develop an approach for the

determination of optical eigen-modes in complex birefringent systems and further, explore the light mechanisms, which could enable topologically protected optical states. We will study the birefringent profiles or structures and their possible dynamics in various geometries, that could lead to topological control of light. Here, it will be interesting to understand and characterize the corresponding eigen modes of light, which we expect will be strongly spatially dependent, both in intensity as well as in the direction. Expectedly, the described topics will lead to multiple scientific publications and presentations, both at fundamental and applied level. The position will open in the Group for soft and partially ordered matter (<http://softmatter.fmf.uni-lj.si>) at FMF UL to work with doc. dr. M. Ravnik (<http://miha.ravnik.si>). The work will be also in full collaboration with several experimental groups in Slovenia and abroad, that work on the related research. Finally, the proposed research is an ambitious fundamental and applied challenge at the world level that could lead to interesting new optical materials and photonic mechanisms based on the combined concepts of topology and material anisotropy.