

Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*)

1. Članica UL (*UL member*):

Fakulteta za matematiko in fiziko

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

Urban Simončič, (urban.simoncic@fmf.uni-lj.si)

3. Raziskovalno področje (*Research field*):

1.02 Fizika

4. Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce.

slo:

Raziskovalno področje usposabljanja mladega raziskovalca (MR) bo medicinska fizika, ožje področje raziskav pa analiza biomedicinskih slikovnih podatkov, pridobljenih z optičnimi slikovnimi metodami. Analiza biomedicinskih slikovnih podatkov zajema procesiranje biomedicinskih slik, luščenje različnih parametrov iz teh slik ter statistično analizo.

Glavni cilj doktorskega dela bo analiza slikovnih podatkov pri razvoju in karakterizaciji sistema za časovno ločljivo presešno slikanje bioloških vzorcev s svetlobo v vidnem in bližnjem infrardečem območju. Svetoba v tem območju se sicer razmeroma malo atenuira v večini biooških tkiv, se pa zelo sipa in je zato neuporabna za klasično presešno slikanje. V skupni za medicinsko fiziko razvijamo sistem za časovno ločljivo presešno slikanje, ki temelji na osvetljevanju vzorca z zelo hitrim (pikosekundnim) laserjem in zajemu slike z zelo hitrim sistemom za zajem slike (slikovnim ojačevalnikom s proženjem). Poleg analize slik bo kandidat vključen tudi v priprave in izvedbe eksperimentov.

Metode dela pri doktorskem delu bodo zajemale:

- Modeliranje transporta svetlobe skozi snov z metodami Monte Carlo in drugimi.
- Načrtovanje in postavitve eksperimentalnih sistemov.
- Priprava optičnih fantomov.
- Meritve v laboratoriju.
- Analize podatkov, pridobljenih z meritvami.

Doktorski kandidat bo vključen v raziskave programske skupine za medicinsko fiziko, ki vključuje raziskovalce na FMF, IJS, UKCL in OI, ter mednarodna sodelovanja s sorodnimi raziskovalnimi skupinami v Evropi in ZDA.

Zahtevana izobrazba: končana 2. stopnja fizike ali tehnične smeri.

eng:

The research field of the PhD candidate will be medical physics, with the focus in analysis of biomedical imaging data, acquired with optical imaging methods. Analysis of biomedical imaging data includes processing of biomedical images, evaluation of various parameters from these images and statistical analysis.

The main objective of the doctoral work will be analysis of imaging data during the development and characterization of time resolved imaging system for the imaging of biological samples in visible and near infrared range of spectrum. In this range, light is not highly attenuated, but it is heavily scattered, so it is not usable for classical transmittive imaging. In our medical physics research group we are developing system for time resolved transmittive imaging, that is based on sample illumination with ultrafast laser pulse (ps range) and image acquisition with ultrafast gated image intensifier. In addition to the image analysis, candidate will be involved in the design and implementation of laboratory experiments.

Working methods of the doctoral candidate includes:

- Modelling of light transport with the Monte Carlo methods and others.
- Design and assembly of experimental systems.
- Preparation of optical phantoms.
- Measurements in laboratory.
- Analysis of data obtained with the lab measurements.

The PhD candidate will be involved in research activities of the Medical physics research group, which includes researchers from Faculty of mathematics and physics, Jozef Stefan Institute, University medical center Ljubljana, and Institute of oncology Ljubljana. The PhD candidate will be also involved in research activities with other research groups in Europe and USA.

Required education: finished second cycle degree of education in physics or technical field.