УНИВЕРЗИТЕТ У БЕОГРАДУ
ИНСТИТУТ ЗА ФИЗИКУ | БЕОГРАД
ИНСТИТУТ ОД НАЦИОНАЛНОГ
ЗНАЧАЈА ЗА РЕПУБЛИКУ СРБИЈУ

Потврда о руковођењу радним пакетом на пројкету

Овим потврђујем да је Др Јадранка Васиљевић, научни сарадник запослен на Институту за физику у Београду, руководилац радног пакета WP4- **Light propagation** in randomized DAPL на пројекту "Control and manipulation of light in complex photonic systems"(CompsLight). Пројекат је финансиран од стране Фонда за науку Републике Србије са буџетом **233.435,86** евра и реализован је у периоду од 1. јануара 2022. до 31. децембра 2024. године.

Београд 30. мај 2025. године

Драгана Јовић Савић

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УНИВЕРЗИТЕТ У БЕОГРАДУ
ИНСТИТУТ ЗА МУЛТИДИСЦИПЛИНАРНА ИСТРАЖИВАЊА
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БЕОГРАД

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15. 12. 2021. год.
БЕОГРАД, Немањина бр. 22-26

УГОВОР О ФИНАНСИРАЊУ РЕАЛИЗАЦИЈЕ НАУЧНОИСТРАЖИВАЧКОГ ПРОЈЕКТА

Control and manipulation of light in complex photonic systems
CompsLight
7714356
У ОКВИРУ ПРОГРАМА ИДЕЈЕ ФОНДА ЗА НАУКУ РЕПУБЛИКЕ СРБИЈЕ
ИЗВОР ФИНАНСИРАЊА: Споразум о зајму број 9029-YF -SAIGE- Пројекат акцелерације иновација и подстицања раста предузетништва у Републици Србији и средства из буџета Републике Србије.

УГОВОРНЕ СТРАНЕ:

1. ФОНД ЗА НАУКУ РЕПУБЛИКЕ СРБИЈЕ, са регистрованим седиштем у Београду, ул. Немањина 22-26, Београд, матични број 17921410, ПИБ 111343775, број рачуна КЈС 840-670723-30, кога заступа др Милица Ђурић-Јовичић, в.д. директора (у даљем тексту: **Фонд за науку**),
са једне стране,

и

2. Реализатор истраживања/корисник средстава одобрених за финансирање Пројекта (у даљем тексту сваки од наведених појединачно означен као **Корисник средстава**, а сви заједнички означени као **Корисници средстава**):

2.1. Акредитована научноистраживачка организација – НИО Институт за физику Београд, Универзитет у Београду (назив научноистраживачке организације), са седиштем на адреси Прегревица 118, Београд-Земун, ПИБ: 100105980, матични број: 07018029, коју заступа Александар Богојевић (име и презиме особе овлашћене за заступање), директор, која је носилац реализације Пројекта (у даљем тексту: **Носилац Пројекта**);

2.2. Акредитоване научноистраживачке организације – НИО (у даљем тексту: **Учесници Пројекта**):

1) Институт за мултидисциплинарна истраживања, Универзитет у Београду (назив научноистраживачке организације), са седиштем на адреси Кнеза Вишеслава 1, Београд-Чукарица, ПИБ: 101012100, матични број: 07002068, коју заступа Драгица Станковић (име и презиме особе овлашћене за заступање), директор (у даљем тексту: **Учесник Пројекта**);

3. Драгана Јовић Савић (име и презиме руководиоца Пројекта), запослена у НИО Институт за физику Београд, Универзитет у Београду Носиоцу Пројекта (у даљем тексту: **Руководилац Пројекта**),
са друге стране.

3. Implementation Plan

3.1. Credentials of PI and members of Project team

- Describe strong points of credentials of the PI and the members of the Project team.
- Describe the complementarity and synergy of the members of the Project team for the proposed research. How will they match the Project's objectives and bring together the necessary expertise?
- Provide a list of members of the Project team in Table 3.1 and their involvement, as a textual description.

PI Dr. Dragana Jović Savić (maiden name: Dragana Jović) is leading a small, but tremendously successful group focusing on the **theoretical** and **numerical** work that can provide predictions of dynamic and stationary effects in photonic crystals physics as well as their **experimental** realization. She is working for more than 15 years successfully in the field of nonlinear optics and photonics. Starting from the theoretical research of photorefractive spatial solitons, photonic lattices, and counterpropagating beams, her focus shifted gradually toward surface solitons and solid-state phenomena such as Anderson localization of light in photonic lattices. Her experimental experience started with her Alexander von Humboldt Fellowship hosted in the Institute of Applied physics, Münster and carried on with DAAD projects. Dr. Jović Savić established a Nonlinear Photonics laboratory and a team of researches – the primary source for CompsLight project members. In this Lab, they have successfully realized experimental results such as the realization of quasi-periodic Fibonacci waveguide arrays or defect-guiding of Airy beams in optically induced waveguide arrays. The group has extended its research from theoretical and numerical modeling to complete experimental investigations, and in the last ten years, the team has been advancing their experimental experience.

Dr. Dejan Timotijević is an experienced researcher in the field of nonlinear optics and metamaterials for more than 30 years, notably giving a foundation of relaxation method for modeling photorefractive materials. He has extensive applicative experience working in an industrial environment as a developer of major scientific visualization software (OriginLab) and in bioinformatics.

MSc Jadranka Vasiljević has recently started her Ph.D. studies, and her thesis is supervised by Dr. Jović Savić. She was included in the DAAD project and spent a few months at Institute for Applied physics in Muenster, where she got a huge experimental experience working on an experiment with an optical induction technique.

Prof. Dr. Milivoj Belić is a world leader in nonlinear photonics; he played an active role in the development of the key concepts of the field as well as theoretical prediction of many effects. He published more than 600 peer-reviewed papers, with more than 7000 citations and his h-index is 39. He is currently a Full Professor at Texas A&M University in Doha, Qatar. In his previous engagement, as Principal research fellow at the Institute of Physics, Belgrade, he initiated nonlinear optics and photonics research in Serbia. He mentored numerous Ph.D. students in this research field, among them Dr. Jović Savić and Dr. Timotijević. He is an internationally well-known expert in nonlinear optics, nonlinear photonics as well as light propagation in photonic crystals and photonic lattices.

All project tasks require a strong synergy and interaction of the team members and their complementary expertise. The planned research program includes continuous, strong interaction of project members and the synergy effect of their complementary expertise: **theory**, **numerics,** and **experiments** in nonlinear photonics. That in turn will guarantee high-quality execution of the project, strong education of students, and will allow new exciting results. The interaction of the project members during the project will rely on personal meetings, discussions, and continuous exchange of information during the years. Our collaboration **in the past years** has been organized along these lines. It has been very successful and resulted in a number of joint **publications in the leading journals**.

Table 3.1. Members of the Project team

ID	Name and family name	SRO	Person-months	Effective person-months
PI	Dr. Dragana Jović Savić	Institute of Physics Belgrade	12	10.8
P1	Dr. Dejan Timotijević	Institute of Physics Belgrade	12	10.8
P2	MSc Jadranka Vasiljević	Institute of Physics Belgrade	12	10.8
P3	Prof. Dr. Milivoj Belić	Texas A&M University Qatar	12	10.8
			Total Person-months: 48	Total Effective person-months: 43.2

- Involvement and roles of the key members of the Project team, as a textual description. Describe in what way each of them will contribute to the proposed research. Show that each has a valid role and adequate resources in the Project to fulfill that role.

Dr. Jović Savić will coordinate all steps necessary for successful project outcomes. She will directly contribute to all aspects in each phase of the project and take particular care of befitting visibility of the project results via publications in highly-ranked scientific journals and presentations at international conferences.

Dr. Timotijević with his experience helps the team in developing theoretical models and numerical codes for solving complex physical problems. His theoretical and numerical work can provide predictions of dynamical and static physical effects in complex photonic systems and the conditions for their experimental realization. He will work with Dr. Jović Savić on the integration of numerical codes and the estimation of optimal experimental parameters.

MSc Vasiljević will share on the one hand his first-hand experimental experience with the optical induction technique from Nonlinear photonics group in Muenster, Germany, and – on the other hand – benefit from the knowledge in the frame of theoretical modeling such systems in the group. She will design the experimental setup with Dr. Jović Savić and Dr. Timotijević's guidance. Also, she will collect numerical results and compare them with experimental.

Prof. Dr. Belić possesses an extensive teaching and research experience. He demonstrated a leadership role in the fundamental science programs including programs in nonlinear photonics. He is shaping the fundamental science programs and establishing a long-term strategy for aligning the goals of this project with new research directions. His experience and deep understanding of similar research topics will be instrumental in the realization of the CompsLight project. His main contribution will be in designing theoretical models for describing processes that take place in SBN crystal.

All key members have full access to the work environment, literature, communication, computer and laboratory setup.

The first period will be used to test new equipment and to prepare set-up for the fabrication of appropriate photonic structures (Dr. Jović Savić, Dr. Timotijević, MSc Vasiljević). Using numerical simulations we will provide appropriate experimental data with the help of colleagues who have long experience in making numerical codes (Dr. Timotijević). We will also analyze obtained experimental results, explore the problems in depth, discuss the relevant issues, and define the physical models (Dr. Jović Savić, Dr. Timotijević, MSc Vasiljević, Prof. Dr. Belić). We will test and run the numerical codes for simulation of the experiment, and then collect numerical results and compare them with the experimental data (MSc Vasiljević, Dr. Jović Savić, Dr. Timotijević).

3.2. Implementation plan

The Project **implementation plan** includes:

- a brief presentation of the overall structure of the work plan;
- detailed work description:
  - a list of work packages[33] (WP) (table 3.2a);
  - a description of each work package (table 3.2b);
  - a list of major deliverables (table 3.2c);
  - a list of milestones[34] (table 3.2d);
  - a list of budget headings (table 3.2.e);
- timing of the different work packages and their components; fill out a Gantt chart (following the **template** available within Project documentation for this Program and Open call published on http://fondzanauku.gov.rs/) to match the implementation plan of this Project and **upload** it. Please use the template provided.
- Note: Data in Tables 3.2a–3.2d must match the Gantt chart.

[33] "Work package" means a major sub-division of the proposed Project.
[34] "Milestones" are control points in the Project that help to chart progress. Milestones may correspond to the completion of a key deliverable, allowing the next phase of the work to begin. They may also be needed at intermediary points so that, if problems have arisen, corrective measures can be taken.

Table 3.2a: List of work packages (WP)

WP No	WP title	WP Lead SRO's acronym	WP Coordinator - team member's ID	Start month	End month	Total calendar months of WP duration
1	**Generation** of DAPL using non-diffracting beams	IPB	PI	1	12	12
2	**Light propagation effects** in DAPL	IPB	P1	13	24	12
3	Generation of **randomized** DAPL	IPB	P1	25	27	3
4	**Light propagation** in randomized DAPL	IPB	P2	28	36	9

3.2b: Work package description

Work package number	1	Work package title	**Generation** of DAPL using non-diffracting beams
Lead SRO's acronym	IPB		
WP Coordinator - team member's ID	PI		
Team members` IDs	PI, P1, P2, P3		

Objectives

This WP is aimed to establish the method to generate and experimentally realize various kinds of non-diffracting beams and investigate the conditions for their existence and propagation. The aim is to extend these concepts to the mutual interaction of two or more beams for their incorporation into complex photonic systems that will be used for the generation of photonic lattices. These reconfigurable and adaptive photonic lattices will be created by laser light in nonlinear refractive index materials. We aim at designing deterministic aperiodic photonic crystal structures, based on such flexible optical induction technique.

Description of work (where appropriate, broken down into sub-activities), and role of the team members

This WP covers the investigation of complex non-diffracting beam propagation, their interaction in photorefractive media, as well as the application in designing complex **DAPL** with different classes of these beams or such **compound** beams, using the various beam size, relative distance and phase difference between two or more beams or beam couples. This work package contains the following sub-activities:

S1.1 Provide numerical codes for the experimental realization of different classes of non-diffracting beams using spatial light modulator (SLM) (**P1, P2**)

S1.2 Prepare the experimental setup for the generation of such beams, their propagation, and interaction (**P1, P2**)

S1.3 Defining theoretical model and prepare numerical code for finding the best parameters of propagation and interaction of such beams as well as generation of DAPL (**PI, P1, P2, P3**)

S1.4 Modification of the experimental setup and generation of complex DAPL (**P2**)

S1.5 Collecting and comparing experimental and numerical data, writing the research papers (**PI, P1, P2**)

Deliverables of the work package (brief description and month of delivery)

D1.1 Refined theoretical model and corresponding numerical code for DAPL prediction (**6th month**)

D1.2 Experimentally generated optically induced DAPL using multiple non-diffracting beams (**12th month**)