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BioQantSense

**Twinning for excellence of the Serbian Research Center
for quantum biophotonics**

Work Package 4

Project management, coordination and monitoring

Deliverable D4.2

Schedule for project meetings

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1 Summary of the deliverable

The report presents plan for mutual visits between IPB and European partners, FSU and CNR. It defines visits, gives the order of visits, declares who (senior, ESR, postdoc, PhD student or administration staff) and for how long is visiting, and describes the purpose of the visit and the expected outcome. It is important to stress at this early stage of the project that this schedule has a tentative nature and sketches the overall process of exchange with some inherent uncertainties. It is expected that the finally effectuated mobility windows of the involved staff depend very much on the individual resources at the individual locations as well as unforeseeable boundary conditions, and they may be subject to some flexibility and adjustments, thereby paying tribute to the optimization of the project outcomes.

According to the plan defined in project WP2, the visits from IPB to FSU and CNR include:

- 8 short (one week) visits by scientific and administration/management staff,
- 12 long (three weeks) scientific visits by ESR and PhD students.

Partner's visits to IPB include:

- 6 scientific visits by FSU and CNR researchers,
- 2 visits by CNR and FSU management/administration staff.

2 Scheduling and Overview of BioQantSense mutual visits

All mutual visits foreseen for BioQantSense are reported in chronological order in the Table 1 where the main information is resumed.

Visits	Type	Where	Duration	When	Project Month	Objectives
1	Scientific	FSU	Short-term visit	December 2022	M3	Lab visit and resolving specific questions on the quantum interferometric setups in Jena. (Connected to a research visit of an external project, accomplished.)
2	Scientific	CNR	Short-term visit	February-March 2023	M5	Finalization of plan for scientific training
3	Scientific	FSU	Short-term visit	March 2023	M6	Finalization of plan for scientific training
4	Scientific	FSU	Long-term visit	March 2023	M6	Introducing methods for quantum imaging with undetecting photons
5	Management	CNR	Mid-term visit	May 2023	M8	Managing EU-funded projects
6	Scientific	FSU	Long-term visit	May-June 2023	M8-M9	Training on quantum interferometry - theoretical and practical
7	Scientific	CNR	Long-term visit	May-June 2023	M8-M9	1st Training on materials and processes for MOEMS manufacturing
8	Scientific	IPB (from CNR)	Mid-term visit	September 2023	M11	Participation to project workshop and Photonica conference; sharing knowledge on photocurable materials and laser-based fabrication processes focused on MOEMS, microfluidics, microrobotics
9	Scientific	IPB (from FSU)	Mid-term visit	September 2023	M11	Participation to project workshop and Photonica conference
10	Management	IPB	Mid-term visit	September 2023	M11	Innovation and transfer - Partner & Funds search and aspects of cooperation with non-scientific sector
11	Scientific	CNR	Long-term visit	November 2023	M14	2nd Training on materials and processes for MOEMS manufacturing
12	Scientific	CNR	Short-term visit	January 2024	M16	Updates and discussion on past training and plan for future training
13	Scientific	FSU	Short-term visit	February 2024	M17	Scientific trainings on quantum holographic microscope
14	Scientific	FSU	Long-term visit	February 2024	M17	Scientific trainings on quantum holographic microscope
15	Management	FSU	Short-term visit	January 2024/February 2024	M16/M17	Innovation and transfer - Implementing a successful project - administrative & managerial aspect.
16	Scientific	CNR	Long-term visit	May 2024	M20	3rd Training on materials and processes for MOEMS manufacturing
17	Scientific	FSU	Long-term visit	May 2024	M20	Lab training on selected system for quantum imaging
18	Scientific	IPB (From CNR)	Mid-term visit	September/October 2024	M24	Sharing knowledge on integrated photonics and spectroscopy for supporting the final integration of the MOEMS; Planning on the activities for exploratory project
19	Scientific	IPB (From FSU)	Mid-term visit	September 2024	M24	Final design on the quantum microscope
20	Scientific	CNR	Long-term visit	November 2024	M26	4th Training on materials and processes for MOEMS manufacturing
21	Scientific	CNR	Short-term visit	January 2025	M28	Resume of training activities and discussion on materials and micro/nano-fabrication set-ups to be exploited for the exploratory project
22	Management	IPB	Short-term visit	January 2025	M28	EU projects approach, design and management
23	Scientific	CNR	Long-term visit	February 2025	M29	5th Training on DLW workstation microdispensing micromanipulation
24	Scientific	IPB (From FSU)	Mid-term visit	February - March 2025	M29-M30	Deliberation on exploratory project
25	Scientific	IPB (From CNR)	Mid-term visit	April 2025	M31	Deliberation on exploratory project
26	Scientific	FSU	Long-term visit	May - June 2025	M32 - M33	Scientific management - exploring toolbox for remote control of experiments
27	Scientific	FSU	Long-term visit	May - June 2025	M32 - M33	Deliberation on the performance of the quantum microscope
28	Scientific	CNR	Long-term visit	July 2025	M34	6th Training on DLW workstation (microdispensing, micromanipulation)

Table 1 Plan of all exchange visits (in blue rows the scientific ones, in green the management ones) between IPB and CNR and IPB and FSU distributed along the project.

2.1 Scientific trainings

2.1.1 Scientific training at IPB

Visits	Type	Where	Duration	When	Project Month	Objectives
8	Scientific	IPB (from CNR)	Mid-term visit	September 2023	M11	Participation to project workshop and Photonica conference; sharing knowledge on photocurable materials and laser-based fabrication processes focused on MOEMS, microfluidics, microrobotics
9	Scientific	IPB (from FSU)	Mid-term visit	September 2023	M11	Participation to project workshop and Photonica conference
18	Scientific	IPB (From CNR)	Mid-term visit	September/October 2024	M24	Sharing knowledge on integrated photonics and spectroscopy for supporting the final integration of the MOEMS; Planning on the activities for exploratory project
19	Scientific	IPB (From FSU)	Mid-term visit	September 2024	M24	Final design on the quantum microscope
24	Scientific	IPB (From FSU)	Mid-term visit	February - March 2025	M29-M30	Deliberation on exploratory project
25	Scientific	IPB (From CNR)	Mid-term visit	April 2025	M31	Deliberation on exploratory project

Table 2 Visits planned for CNR and FSU scientific staff to IPB distributed along the project.

The training at IPB by CNR and FSU (see Table 2) is envisioned as series of lectures, seminars, and discussions on various project tasks, as well as practical demonstration in the laboratories. Plan for training will be realized through three visits both by CNR and FSU researchers, spread evenly through three years (visits n^o 8, 9, 18, 19, 24, 25). Duration of visits will be 2 to 3 days. The visits have been rationally scheduled, allowing enough time for training, a proper education and knowledge transfer that is needed for the exploratory project. **FSU** will present talks on fundamentals and principles behind quantum interferometry and quantum imaging, and will share experience in integrating quantum enhanced imaging into existing imaging set-up at IPB. IPB will learn about design and operation of systems for quantum imaging and spectroscopy, as well as design and operation of tailored quantum light sources. Lectures given by **CNR** will be on development of photocurable materials and composites with different functionalities and processed by laser-based technologies for varied fields of applications; on advanced laser-based fabrication processes focused on MOEMS, microfluidics and optofluidics for lab-on-a-chip devices with integrated biomimetic elements for chemical and biological sensing. In the second year, lectures will also include topics on integrated photonics and spectroscopy for supporting the final integration of MOEMS, that is part of the exploratory project. Also, CNR will analyse materials already used at IPB and discuss its improvement with respect to surface quality, optical properties, photo-responsiveness and manufacturability using direct laser writing.

2.1.2 Scientific training at CNR

Visits	Type	Where	Duration	When	Project Month	Objectives
2	Scientific	CNR	Short-term visit	February-March 2023	M5	Finalization of plan for scientific training
7	Scientific	CNR	Long-term visit	May-June 2023	M8-M9	1st Training on materials and processes for MOEMS manufacturing
11	Scientific	CNR	Long-term visit	November 2023	M14	2nd Training on materials and processes for MOEMS manufacturing
12	Scientific	CNR	Short-term visit	January 2024	M16	Updates and discussion on past training and plan for future training
16	Scientific	CNR	Long-term visit	May 2024	M20	3rd Training on materials and processes for MOEMS manufacturing
20	Scientific	CNR	Long-term visit	November 2024	M26	4th Training on materials and processes for MOEMS manufacturing
21	Scientific	CNR	Short-term visit	January 2025	M28	Resume of training activities and discussion on materials and micro/nano-fabrication set-ups to be exploited for the exploratory project
23	Scientific	CNR	Long-term visit	February 2025	M29	5th Training on DLW workstation microdispensing micromanipulation
28	Scientific	CNR	Long-term visit	July 2025	M34	6th Training on DLW workstation (microdispensing, micromanipulation)

Table 3 Visits planned for IPB scientific staff to CNR distributed along the project.

Scientific visits planned for IPB staff to CNR are reported in Table 3. During the first-year visits (visits n^o 2, 7, 11), IPB members will be acquainted with the current research at CNR, their capabilities for synthesis and analysis of novel photo-responsive materials, equipment at their disposal. Whenever possible, demonstrations of experimental procedures, processes and protocols will be conducted. Materials design and microfabrication procedures will be in focus. Moreover, integrated photonics and spectroscopy applied to the study of living matter will be considered a propaedeutic part, necessary in the exploratory project for the interfacing of the optical imaging system with the MOEMS and lab-on-a-chip devices.

During the second year visits (visits n^o 12, 16, 20) results will be analysed with respect to the previously established goals. Also, these visits will be devoted to establishing complex manufacturing processes, necessary to fabricate MOEMS and lab-on-a-chip (LoC) devices at IPB, using microdispensing, micromanipulation and direct laser writing (DLW).

Considering that the exploratory project should start on October 2024, the third year visits (visits n^o 21, 23, 28) will be devoted to the overall evaluation of the final design of the lab-on-chip device selected for cells support and imaging through quantum holographic microscope. The discussion will take into account tested materials and properly modified micro/nano-fabrication set-ups.

2.1.3 Scientific training at FSU

Visits	Type	Where	Duration	When	Project Month	Objectives
1	Scientific	FSU	Short-term visit	December 2022	M3	Lab visit and resolving specific questions on the quantum interferometric setups in Jena. (Connected to a research visit of an external project, accomplished.)
3	Scientific	FSU	Short-term visit	March 2023	M6	Finalization of plan for scientific training
4	Scientific	FSU	Long-term visit	March 2023	M6	Introducing methods for quantum imaging with undetecting photons
6	Scientific	FSU	Long-term visit	May-June 2023	M8-M9	Training on quantum interferometry - theoretical and practical
13	Scientific	FSU	Short-term visit	February 2024	M17	Scientific trainings on quantum holographic microscope
14	Scientific	FSU	Long-term visit	February 2024	M17	Scientific trainings on quantum holographic microscope
17	Scientific	FSU	Long-term visit	May 2024	M20	Lab training on selected system for quantum imaging
26	Scientific	FSU	Long-term visit	May - June 2025	M32 - M33	Scientific management - exploring toolbox for remote control of experiments
27	Scientific	FSU	Long-term visit	May - June 2025	M32 - M33	Deliberation on the performance of the quantum microscope

Table 4 Visits planned for IPB scientific staff to FSU distributed along the project.

Scientific visits planned for IPB staff to FSU are summarized in Table 4. Regarding the first year visits (visits n^o 1, 3, 4 and 6) their purpose will be to proceed with tutorials in quantum optics for quantum microscopy, and with the joint practical lab training. The focus of these visits will be primarily on exploring different modalities of quantum imaging with undetected photons. It is up to the visits during the second year (n^o 13, 14 and 17) too, through design, simulation and construction of quantum imaging and spectroscopy systems, make a final choice of the quantum microscope, to be developed by the Exploratory project. The visit n^o 17 will be devoted to development of highly compact prototypes that is chosen for quantum imaging with undetected photons. In the final, n^o 27 visit to FSU, analyses of performances of the quantum microscope, used in the exploratory project, will be bases for the plan for future developments and improvements of this type of laser microscope. Attached to this visit is the visit to the LASER World of Photonics Conference in Munich (June 2025).

2.2 Administrative, management and scientific management training

Visits	Type	Where	Duration	When	Project Month	Objectives
5	Management	CNR	Mid-term visit	May 2023	M8	Managing EU-funded projects
10	Management	IPB	Mid-term visit	September 2023	M11	Innovation and transfer - Partner & Funds search and aspects of cooperation with non-scientific sector
15	Management	FSU	Short-term visit	January 2024/February 2024	M16/M17	Innovation and transfer - Implementing a successful project - administrative & managerial aspect.
22	Management	IPB	Short-term visit	January 2025	M28	EU projects approach, design and management

Table 5 Mutual visits planned for IPB, CNR and FSU administrative/management staff distributed along the project.

The administrative and management training (see planned visits in Table 5) will be at IPB during two visits by respective partners' officials from CNR and FSU (visits n^o 10 and 22), and

during two visits of IPB administration staff to partner's institutions (visits n^o 5 and 15). Duration of these visits is 2 to 3 days. The subjects of meetings are training sessions on how to prepare successful proposals for EU grants, also in relation to the aspects of innovation and technology transfer. Training on successful managing of EU projects will cover the whole cycle for management of EU funded projects: 1. use of participant portal; 2 budget aspects (plan, eligible and not eligible costs, budget flexibility, monitoring, audit); 3. when an amendment is needed.

FSU offers tutorials on selected topics of scientific management, which when implemented will be of great importance for sustainable impact of BioQantSense beyond its funding period. Thus, during the visit to FSU (visit n^o 15) and at IPB (visit n^o 22) IPB research and administration staff will be introduced to several topics of scientific management, in which FSU has considerable expertise. Transfer and innovation are of interest for Serbian photonic society, and will be tackled as aspects of insights into the optics and photonics ecosystem Jena, one of the most visible and productive photonics high-tech clusters in Europe. Through the strategy that is behind these topics, IPB can become the center for project- and person-oriented collaboration between the research institutions, universities, and optics and photonics companies. Such a Belgrade ecosystem, organized under the Serbian Optical Society, will have an important role in promotion of photonics science and technologies, the role we can emphasize through, for instance, development of an optical museum, modelled on the Jena emerging Deutsches Optisches Museum.

IPB has also interest in another topic of scientific management offered by FSU, namely remotely controlled labs, trendy but very useful method of experimental and educational science. FSU is offering training on the development of an open-source toolbox for remote control of photonics training. In a preparation for the visit to FSU, a simple optical experimental setup with possibilities for online control will be conceived and used for such training.

Staff management of the Institute of Optics of CNR (CNR-INO) will offer training on the whole cycle for management of EU funded projects. During mutual visits planned with IPB with CNR-INO (visits n^o 5 and n^o 10) , Grant Office staff will organize workshop, tutorials and best practices to be transferred to IPB staff on administrative, financial and management aspects, acquired at CNR-INO in several EU funded projects during Horizon Europe, Horizon 2020 and FP7 framework programs. Aspects addressed on these visits will be primarily focused into supporting IPB to successful coordinate the BioQantSense project and EU funded projects. Moreover, the experience of CNR-INO in collaborative frameworks will be included in training programme. Educational and practical lessons from CNR-INO will cover at list the following topics:

- Use of EU Funding and Tenders and Sygma portals
- Project budget aspects (plan, eligible and not eligible costs, budget flexibility, monitoring, audit)
- Financial management and reporting
- Obligations imposed by Consortium Agreement and Grant Agreement at scientific, legal and financial levels



- When amendment is needed for a project

Administrative organization, practices and tools implemented at CNR-INO to manage procedures and documentation to be provided and hold as required in Grants obligations could be also aspects included.