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BioQantSense

Twinning for excellence of the Serbian Research Center for quantum biophotonics

Work Package 2

Knowledge and skill transfer/exchange

Deliverable 2.3

Mid-term report on visits at FSU

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Summary

1 Introduction

The Deliverable D2.3 reports on the management and scientific mutual exchange visits that have been implemented between IPB and FSU during the first part of the BioQantSense project. The number, the order and the duration of visits as well as the potential purposes and outcomes to be accomplished along the three years of the project were tentatively defined at M7 and are already reported in the Deliverable D4.2.

This Deliverable D2.3 however places stronger emphasis on reporting the concrete trainings that have be effectuated as well as on the content, knowledge and skills that have been trained towards IPB staff. The Table 1 resumes management/scientific visits originally foreseen at FSU until M18.

Visit	Type	Where	Duration	When	Project Month	effective date	involved people
1	Scientific	FSU (from IPB)	Short-term visit	December 2022	M3	4-11 December 2022	Marija Curcic
4	Scientific	FSU (from IPB)	Short-term visit	March 2023	M6	10-13 April 2023	Brana Jelenkovic
5	Scientific	FSU (from IPB)	Long-term visit	March 2023	M6	10-28 April 2023	Filip Krajnic
7	Scientific	FSU (from IPB)	Long-term visit	May-June 2023	M8-M9	11 October - 3 November 2023	Filip Krajinic
11a	Dissemination	FSU (from IPB)	Short-term visit	December 2023	M15	8-9 December 2023	Zoran Grujic
13	Scientific	FSU and Darmstadt (from IPB)	Short-term visit	February 2024	M17	27-29 February 2024	Brana Jelenkovic, Marija Curcic, Filip Krajnic
14	Scientific	FSU (from IPB)	Long-term visit	February 2024	M17	Postponed to April/May 2024	
15	Management	FSU (from IPB)	Short-term visit	February 2024	M17	10-13 March 2024	Dusica Vukcevic Stojiljkovic

Table 1. Scientific/management visits of IPB staff traveling to FSU planned and effectuated during the first part of the BioQantSense project (till M18).

Two minor deviations from the original plan are reported:

1) Visit #11a was added as an additional visit from IPB to FSU devoted mainly to dissemination, and connected to another research visit of an external project.
2) Visit #14, originally scheduled for February 2024 was postponed to April/May 2024 due to personal reasons of the anticipated person to travel. In the view of the project coordination and partners, there is no substantial drawback concerning the progress of the project due to this short delay. The visit will be reported in a forthcoming Deliverable.

2 Scientific visits

As an extract from Table 1, the following Table 2 is listing specifically those visits of IPB staff to FSU who were scheduled with a scientific purpose:

Visit	Type	Where	Duration	When	Project Month	effective date	involved people
1	Scientific	FSU (from IPB)	Short-term visit	December 2022	M3	4-11 December 2022	Marija Curcic
4	Scientific	FSU (from IPB)	Short-term visit	March 2023	M6	10-13 April 2023	Brana Jelenkovic
5	Scientific	FSU (from IPB)	Long-term visit	March 2023	M6	10-28 April 2023	Filip Krajnic
7	Scientific	FSU (from IPB)	Long-term visit	May-June 2023	M8-M9	11 October - 3 November 2023	Filip Krajinic
13	Scientific	FSU and Darmstadt (from IPB)	Short-term visit	February 2024	M17	27-29 February 2024	Brana Jelenkovic, Marija Curcic, Filip Krajnic

Table 2. Extract from Table 1 with a focus on the scientific visits only.

As a general overview on scientific visits, during the first year:

- Short-term visits #1 and #4, IPB members have been first acquainted with the current research at FSU through laboratory visits, short seminar and discussions.
- Then, the long-term visits #5 and #7 have been focused on practical training through demonstration of experimental procedures, processes and protocols, aimed at transferring skills and expertises to be installed at IPB and beneficial to the exploratory project WP5 finalization.
- Visit #13 was implemented as a short-term visit not only to FSU but also to the nearby city Darmstadt, where the former FSU project leader Prof. Markus Gräfe has meanwhile received a call for a professorship and thereby moved from Jena to Darmstadt already at the beginning of the project. This visit is a consultation of Prof. Gräfe to include his specific expertise in quantum imaging and holography into the project as his expertise is vital for the success of the BioQantSense project and particularly for the exploratory project WP5.

2.1 (Scientific) Visit #1

The 1st short-term visit, referred to as Visit #1, was effectuated by Mrs. Marija Ćurčić from IPB on 4-11 December 2022. Mrs. Ćurčić at this time was at the final phase of finishing her PhD thesis. FSU attendees were Christian Helgert, Frank Setzpfandt, Johannes Kretzschmar, Emma Brambila-Tamayo and Josué Léon Torres (FSU).

The visit was focused on introducing the IPB guest to the main FSU research and lab activities and technologies. The scope was to give an oversight about the existing setups in Jena and the potentials and modifications that could be done towards the achievement of goals in the BioQantSense project. To this end, the visitor from IPB was introduced into the main scientific activities at FSU with particular focus on quantum imaging and quantum coherence processes.

Particularly, the research group of Frank Setzpfandt explained the generation of non-classical states of light and their application using theoretical and experimental approaches. Specific

knowledge was transferred with respect to the generation of photon pairs by spontaneous nonlinear processes in various nonlinear photonic systems ranging from bulk crystals over different waveguide structures to nanostructured or atomically thin surfaces. With the aim to fundamentally understand the nonlinear effects leading to photon-pair generation and how they depend on the material and geometry of the sources, project partners are going to use this understanding to tailor the properties of the generated two-photon quantum states, like spectrum, spatial distribution, and entanglement, to meet the demands of specific bio-scientific applications within the project.

In a further step, the discussions were directed towards the application of photon pairs for quantum-enhanced imaging and spectroscopy techniques particularly devoted to the BioQantSense project. One major benefit is that the partners here can enable measurements with better signal-to-noise ratio or in hardly accessible wavelength ranges.

Figure 1. Inspection of one of the quantum optical setups on occasion of visit #1.

Upon the end of the visit, it was agreed that the competencies and new information passed to the IPB visitor should now be transferred also to other IPB staff. Notes were taken on potential small and medium laboratory instruments or optical setup parts that IPB could purchase within the framework of the project to improve IPB laboratories efficiency and quality. Particularly, it was agreed that some priorization of such quantum optical experimental setups and with regards to their feasibility in view of the allocated resources within the BioQantSense project should be assessed, as a next step.

2.2 (Scientific) Visit #4

Visit #4 was effectuated by Prof. Brana Jelenković from IPB on 10-13 April 2023. FSU attendees were Frank Setzpfandt, Mohit Kumar, Johannes Kretzschmar and Josué Léon Torres (FSU).

As a follow-up from visit #1, the focus was on introducing the senior IPB staff to the main FSU research and lab activities and technologies. The partners shared the scope to finalize joint plan for scientific training within the course of the BioQantSense project. Particular emphasis was placed on:

1) To highlight the IPB expertise and skills to be transferred to Serbian partners to raise their scientific excellence towards the European standard.

2) To finalize the draft of the plan of experimental activities for the scientific training foreseen along the project.
3) To proceed with a concrete purchase list of items and equipment to be needed in the IPB laboratories to proceed with their own quantum imaging setup.

With respect to the experimental activities, researchers from FSU and IPB jointly discussed different modalities to implement quantum imaging in order to identify the most suitable to achieve the goals of the project. The two potential methods are Quantum Ghost Imaging and Imaging with undetected photons. Both methods can achieve quantum imaging in the mid-infrared, however, Ghost Imaging is using detectors at all involved wavelengths and correlation measurements, whereas imaging with undetected photons needs a high-resolution camera in the visible spectral range only to achieve infrared imaging, but as an interferometric setup has more demands on the experimental implementation. The joint decision was made to focus on imaging with undetected photons, as it has a higher potential for applications while having a lower demand on the needed technical resources.

2.3 (Scientific) Visit #5

Visit #5 was effectuated by Mr. Filip Krajinić from IPB on 10-28 April 2023. FSU attendees were Mohit Kumar, Johannes Kretzschmar, Christian Helgert, Frank Setzpfandt, Thomas Pertsch and Josué León Torres (FSU).

The goal of this long-term visit was the exchange of knowledge between IPB and FSU and to get helpful advice from the experienced groups of FSU in the previously defined area of quantum imaging with undetected photons. During the first week, several laboratories and key lab persons in the local Abbe Center of Photonics (ACP) and the Fraunhofer Institute for Applied Optics and Precision Engineering (IOF) researching different topics in the fiends of quantum imaging were visited and involved.

At the time, multiple possible mechanisms for constructing a quantum microscope at IPB were still considered, having two major solutions. The first one was based on the mechanism of Ghost Imaging while the second one followed the principle of quantum interferometry with undetected photons. As a result of extended discussions, the principle of a quantum interferometric setup with undetected photons was again confirmed as the best-matching solution to be followed in more detail. Experimental advantages of this decision include that the so-called idler photons (usually in the infrared spectrum) must not necessarily be detected. In the infrared spectrum, detectors are in general expensive and, depending on the target spectrum of the anticipated quantum microscope, out of the budget of the BioQantSense project. Thus, the choice of quantum interferometry with undetected photons provides more cost-efficient results in the field of quantum imaging in the infrared spectrum without having to detect the aforementioned photons. Moreover, depending on the scheme to be developed, a wide spectral range of biological specimen can be covered later on.

Also, during the first week of the visit, an online meeting including all four parties of the project, Institute of Physics University of Belgrade (IPB), Consiglio Nazionale delle Ricerche (CNR), Friedrich Schiller University Jena (FSU) and Faculty of Biology University of Belgrade (FBUB), was held to discuss the plans and the progress of building the Lab-on-a-Chip device and a quantum microscope.

During the second week of the visit, the main focus was to devise a script simulating the source for the quantum microscope, correlated signal pairs using the Spontaneous Parametric Down-Conversion (SPDC) nonlinear process in a variety of different types of nonlinear crystals either by angle tuning or temperature tuning (BBO, AGS, ppKTP...). At the end of the second week and at the start of the third week, direct hands-on training in one of the labs was conducted in order to transfer the relevant skills on operation quantum imaging setups using quantum interference with undetected light towards the IPB guest.

At the end of the third week, which was concluding the long-term visit, the specific setup for the quantum microscope which is planned to be built at IPB got really detailed and involved. The partners considered different spectral ranges of the quantum microscope, specified a list of essential optical and opto-mechanical components for the setup, and ideas on future collaboration in the coming long-term visits.

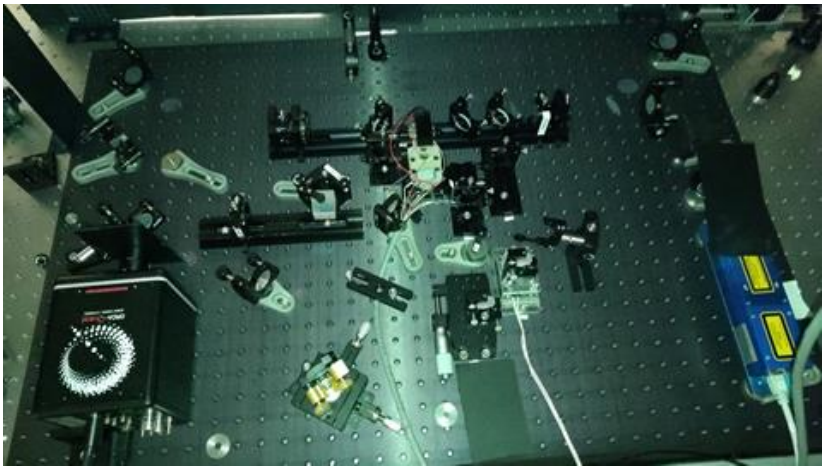

Figure 2. Quantum microscopy setup developed in Jena by the end of visit #4.

2.4 (Scientific) Visit #7

Visit #7 was again effectuated by Mr. Filip Krajinić from IPB on 11 October – 3 November 2023. FSU attendees were Mohit Kumar, Johannes Kretzschmar, Frank Setzpfandt, Canan Gallitschke, Christian Helgert and Josué León Torres (FSU).

Primary expected outcome of this scientific visit was to obtain experimental measurements of the newly developed off-axis quantum interferometer using undetected light. The joint works in the meantime had progressed in such a positive way that it is a realistic goal to publish a first joint paper on this topic. The respective measurements were done at the laboratories in Jena during the visit. Additionally, further discussions were held for future plans and joint

research activities of both IPB and FSU and building a quantum interferometer at IPB and doing future measurements of various different samples.

The start of the long-term visit was dedicated to Photonics Days Jena, a locally organized, international conference held on 12th and 13th of October. At the Photonics Days Jena, students and doctoral candidates have the opportunity to network face-to-face with representatives of renowned photonics organizations. Even before graduating, students and doctoral candidates can gain perspectives for their own career paths, receive personal advice and develop meaningful connections. The Photonics Days Jena were originally created as a networking event to address the needs of the next generation as well as the optics and photonics industry: Young scientists are sensitized to the knowledge and skills that are advantageous when applying for jobs. Thus, the co-location of this conference with visit #7 was a matching opportunity for another transfer of skills and information from FSU to IPB. Among many other scientific contributions, on keynote talk was centred about the role of optics and photonics in space-orbit communication including the usage of Quantum Key Distribution protocols that will in the future ensure for a secure, tab-proof communication.

Figure 3. Impressions of workshops and entrepreneur pitches at the Photonics Days in Jena in October 2023.

Continuing on the scientific scopes of the visit, the laboratory was dedicated to getting accustomed to the quantum interferometer that was starting to get built in the previous long-term visit in April. The setup was optimized in order to acquire the most reliable measurement results. For these measurements, standardized phase objects (transparent glass plates with engraved elements on it with a depth of a couple hundred nanometres) were used as objects to image.

After optimizing the setup for the second week of the long-term visit, the first two measurements with publishable relevance were done. The first measurement was recording holograms with different exposure times for a single frame in order to determine the relation between the Signal-to-Noise ratio of the reconstructed image and exposure time of a digital camera. The second measurement was to determine the influence of different values for the relative angle between two signal beams interfering at the camera plane. Different values for the relative angle lead to different periods of the fringe pattern which are later analysed in order to reconstruct the hologram. For these measurements, different phase objects were

used in order to have a quantitative metric for the results. At the end of this week, preparations were made for the next measurements. These included using polymer materials as an object which changes it refractive index with different temperature values. This polymer was prepared by our partners from CNR, Florence.

The last week of the visit was dedicated to measuring the phase difference induced by heating the polymer. The final measurements were performed in order to determine in which regime the setup is working, in either quantum or classical regime. Additionally, all partners and collaborators evaluated and discussed the obtained measurements, worked on principle strategies on how to draft a respective scientific paper, and discussed future step in order to build the setup at IPB.

2.5 (Scientific) Visit #13

Visit #13 was effectuated by Prof. Brana Jelenković, Dr. Marija Ćurčić and Mr. Filip Krajinić from IPB on 27-28 February 2024. FSU attendees were Markus Gräfe and co-workers. Prof. Gräfe was formerly a research group leader at FSU and was foreseen as the key person and project leader on behalf of the FSU part of the BioQantSense project. In 2022, practically with the onset of the project, Markus Gräfe received and accepted a call from the Technical University of Darmstadt, only 300 km distant from Jena. Yet, he is still bound to Jena by a co-affiliation and some research responsibilities at the local Fraunhofer Institute of Applied Optics and Precision Engineering in Jena. Thus, his specific expertise in the field of interest is considered by all project partners still to be most beneficial for the successful realization of the BioQantSense project goals.

Accordingly, it was decided that the IPB staff should meet Markus Gräfe in Darmstadt to get his insight/feedback on the project's progress. The visit started with partners from IPB giving two lectures presenting the fields of research at the IPB, namely "Relative two-mode amplitude squeezing by four-wave mixing in alkali vapor" by Marija Ćurčić, and "Morpho butterfly wing as bioderived imaging sensor" by Filip Krajinić.

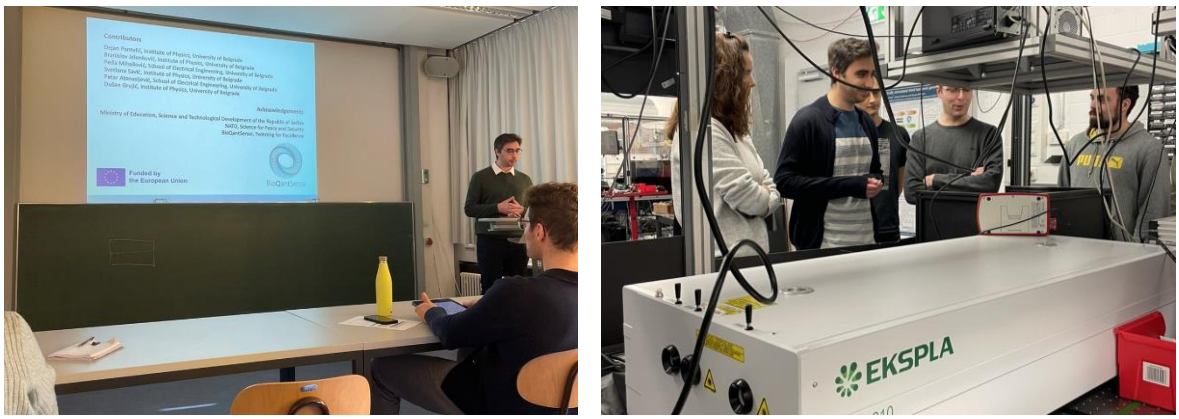

Figure 4. Impressions of the talks from IPB researchers and lab tours at the Institute of Applied Physics, TU Darmstadt on occasion of visit #13.

The visit continued with organized laboratory tours and meeting key lab persons in the Institute of Applied Physics, TU Darmstadt researching the fields of quantum optics as both fundamental studies and application in communication, quantum computing, quantum sensing and environmental science. The focus of the visit was primarily on Prof. Gräfe's group introducing their experiments for application in quantum imaging in mid-infrared spectrum to IPB staff. The visit concluded with a round table discussion with the goal to talk through the progress on constructing a quantum microscope with the suitable requirements and limitation for bioimaging at IPB. It was confirmed that the decision for the quantum imaging scheme with Undetected Photons is a feasible path to consider further, and that the experimental progress of the BioQantSense teams is on track. Moreover, additional plans were made for future collaborations including the present parties in Darmstadt.

3 Management visits

As an extract from Table 1, the following Table 3 is listing specifically those visits of IPB staff to FSU who were scheduled with a management purpose:

11a	Dissemination	FSU (from IPB)	Short-term visit	December 2023	M15	8-9 December 2023	Zoran Grujic
15	Management	FSU (from IPB)	Short-term visit	February 2024	M17	11-12 March 2024	Dusica Vukcevic Stojiljkovic

Table 3. Extract from Table 1 with a focus on the management visits only.

3.1 Definition of training units and content

A first, a preparatory visit of IPB staff to FSU to tackle this took place in December 2023. This visit was aligned with a continuous exchange via email and digital communication following up on the specific, operative implementation of measures indicated in the analyses and proposed instruments in WP1. Matching with the capabilities of the both partners, FSU and IPB elaborated a longlist of matching training units for management skill transfer. At month M18 of the project, the concrete results of these foreseen trainings reads as:

3.1.1 Training in applying for EU proposals

This training will be suitable for individuals working in administration, grant acquisition and EU horizon specialists. The training will be delivered by an expert of the Service Centre for Research and Transfer at FSU, a central unit specialized in acquiring and delivering EU projects.

3.1.2 Transfer and innovation – building a photonics ecosystem

This training will be suitable for individuals who are long-term strategic decision makers or consultants to them, but also professors with managing ambitions beyond science. Insights into the optics and photonics ecosystem Jena, one of the most visible and productive photonics high-tech clusters in Europe. The strategy behind this is comprising a multitude of theme-, project- and person-oriented collaboration forms between the University, three local non-university photonics institutes, the emerging Deutsches Optisches Museum, and about 170 optics- and photonics-related companies, all of them located in the Jena region.[1] These prime strategic partnerships are showing a strong societal impact, not only in the Jena region. This strategy has manifested in a dynamic and ever-growing exchange of people, ideas, research results, finally leading to new intellectual property, optical system prototypes or start-ups – and has evolved as one of the key distinguishing features of Jena as an internationally unique photonics hub and ecosystem.

[1] www.acp.uni-jena.de/partners

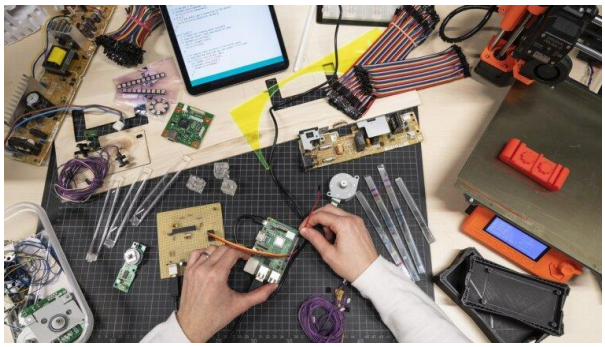


Figure 5. Impressions of workshops in the Lichtwerkstatt Jena – Open Photonics Makerspace.

3.1.3 Open innovation

This training will be suitable for innovation managers and academic people at every (academic) stage with an entrepreneurial spirit; furthermore, also suitable for scientists and technicians who like to create scientific value beyond their own field. The partner FSU has recently contributed significantly to an open innovation movement in Germany. The so-called Lichtwerkstatt is Germany's first photonics makerspace, where citizens, researchers and companies with an interest in optics and photonics have free access to modern technical equipment (including AR/VR, 3D scanning, 3D printing, laser cutting, microelectronics) and the necessary know-how to realize their own ideas.[2] In addition to representatives from companies and academia, many dedicated Master's degree students from the fields of physics, photonics, IT sciences and media management are the main users of the makerspace. The IPB training will include insights insight on how our Lichtwerkstatt has become a lively space for creative work, knowledge exchange, prototyping, joint experimentation and two start-ups.

3.1.4 Internationalization and digitalization of academic research and education

This training will be suitable for academics engaged in teaching, lecturing and also talent acquisition. The education concept of Jena's Abbe School of Photonics offers multidisciplinary coverage in the field of optical and photonics technology. Our school is part of a full-scale education photonics program under the auspices of the Faculty of Physics and Astronomy at FSU. Students enrolled in our on-campus and online Master of Science in Photonics are offered a distinguished education track starting at the Bachelor level, continuing in the Master's degree program and culminating in a coordinated doctoral program (equivalent to Ph.D. level). Some scholarships are available for high-performance applicants. In recent years, high-quality digitalization of our academic education concepts has become part FSU's DNA. In this training unit, it is planned to share training units on the lessons learned so far.[3]

[2] www.lichtwerkstatt-jena.de

[3] www.asp.uni-jena.de/digital-teaching

3.1.5 Remotely controlled labs

This training unit will be suitable for academics engaged in hands-on lab teaching to students, scientific communications as well as technical lab responsible persons. Remote labs are a trendsetting way of teaching, communicating, and experiencing science as well as enabling collaborative work. Unfortunately, the implementation of remote access involves a cost-intensive development or at least requires a certain technical skillset. To establish remote labs across disciplines, especially outside the field of IT and engineering, the technical access threshold must be low enough to support a self-contained implementation by researchers, assistants, and technical staff. The partner Jena is offering training on the development of an open-source toolbox for the research field of Photonics. We are offering training and advices concerning a modular way of building a web-based application to control optical experimental setups with the integration of VR and AR endpoints.

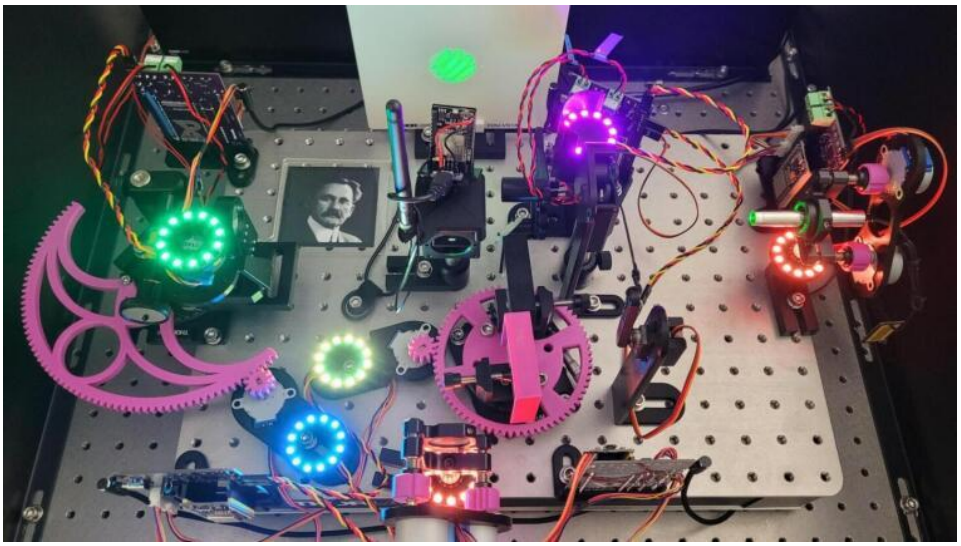

Figure 6. Prototype of a remotely controllable Michelson interferometer with a digital twin for education purposes.

3.2 (Management) Visit #11a

This short-term visit was originally not foreseen on the visiting plan, but was added due to the lucky occasion of Dr. Zoran Grujić visiting Jena on behalf of other professional duties. He and Dr. Christian Helgert met on 8-9 December and worked on the elaboration of management trainings as detailed above. Moreover, the general strategy of dissemination and outreach of the BioQantSense project were subject of this exchange.

3.3 (Management) Visit #15

Visit #15 was effectuated by Mrs. Dušica Vukčević Stojiljković from IPB on 11-12 March 2024. FSU attendees were Mareile Knees, Immo Feine, Thomas Wartner, David Zakoth and Christian Helgert. It focused on the training and exchange on the successful application in EU funding programs. FSU prepared and delivered also abundant material with focus on the establish-

ment and expansion of business contacts/networks, initiation, special workshop formats, processes and experiences. Moreover, the tools and methods covered particularly the Impact Canvas Model and others. The following knowledge and insights were transferred towards IPB during the visits:

3.3.1 Training in applying for EU proposals

The focus of the training provided under this topic was on academia-industry cooperation, search for funding, application process, partner search, establishment and expansion of business contacts/networks. This training was delivered by Dr. Mareile Knees, Research Funding Officer of the FSU Service Centre for Research and Transfer, a central unit of FSU specialized in acquiring and delivering EU projects and Dr. Christian Helgert, CEO, scientific management at the Abbe Center of Photonics (ACP).

Dr. Mareile Knees presented The Service Center for Research and Transfer and shared her and FSU's experience in searching and obtaining EU funding with IPB Project Department representative. The Service Center offers a wide range of support to University's researchers, from initiation to implementation of research and cooperation projects along the entire innovation process (Research & Transfer Events, Workshops, further training offers, Research funding database). Dr. Christian Helgert sharpened this perspective with regard to the Abbe Center of Photonics (ACP), the concrete BioQantSense project partner and a department-like sub-unit of FSU. ACP is the academic center of scientific activities in the fields of optics and photonics at the Friedrich Schiller University Jena. It is, on the one hand, strongly engaged in young-career scientists' education via its integrated Abbe School of Photonics and, on the other hand, sustains strong links with local industry partners as well as with the international scientific community, which was particularly interested as a topic for this management visit.

3.3.2 Nucleus Jena – Training on Innovation Management

Nucleus Jena is a joint initiative of the Ernst Abbe University Jena and the Friedrich Schiller University Jena, so both local Higher Education Institutions. The project is funded by the German Federal Ministry of Education and Research and pursues the overarching goal of making the research-based transfer of ideas, knowledge and technology more efficient as a key prerequisite for successful and result-oriented innovation processes.

The trainers, Mr. Immo Feine and Dr. Thomas Wartner, both Nucleus Jena Innovation managers, presented the project and its activities, the initiation of innovation processes, their established workshop formats and respective experiences, tools and methods. These included the Impact Canvas Model and other topic that Nucleus Jena deals with and were of high relevance for this management visit.

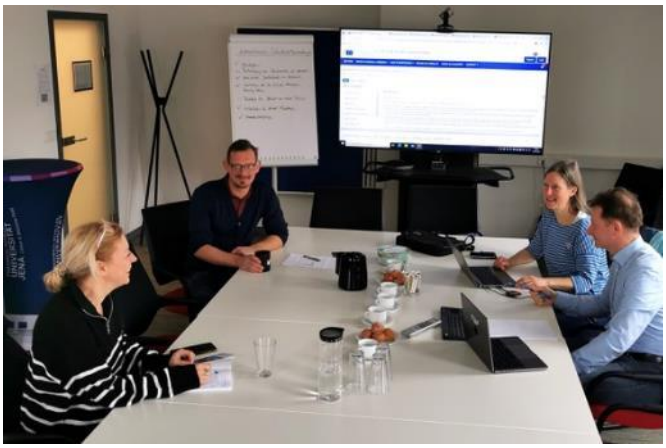

Figure 7. Impression of the meeting of IPB management staff with NUCLEUS Jena in early 2024.

3.3.3 Open innovation training

Jena has recently contributed significantly to an open innovation movement in Germany. The so-called Lichtwerkstat is Germany's first photonics makerspace, where citizens, researchers and companies with an interest in optics and photonics have free access to modern technical equipment (including AR/VR, 3D scanning, 3D printing, laser cutting, and microelectronics) and the necessary know-how to realize their own ideas. In addition to representatives from companies and academia, many dedicated master's students from the fields of physics, photonics, IT sciences and media management are the main users of the makerspace.

Dr. Christian Helgert and David Zakoth, M.Sc, Lichtwerkstatt Jena strategy and marketing manager, presented inside of this open makerspace and provided training on how Lichtwerkstatt has become a lively space for creative work, knowledge exchange, prototyping, joint experimentation and even start-ups. The model may not be fully transferable to the structure and framework of the IPB, but the connection of open science and open innovation may serve at a guiding principle to be further explored in further trainings within BioQantSense.

3.3.4 Report on current state of IPB and its Department for International Projects and Collaboration

On the side of IPB, the visitor Dusica Vukcevic Stojiljkovic presented IPB's Department for International Projects and Cooperation, established at the beginning of 2022, to all aforementioned persons. The constructive dialogue on possibilities to improve the IPS's project management skills was conducted, respecting the difference in funding possibilities and state frameworks for research and innovation support. As an intermediate outcome, IPB can encourage the scope and quality of research and increase the degree of its application to the economy through increased flow and application of new scientific knowledge, by assisting in the process of developing key scientific and engineering talent, by working with government

and industry in finding practical modalities for efficient transfer of new knowledge from research and development centers to the economy (“IPB Strategy and Action plan”).

One of the essential aspects of achieving this goal is adequate management and internal institutional support. Nucleus Jena, The Service Center for Research and Transfer, and Lichtwerkstatt Jena – Open Photonics Makerspace are existing successful examples to follow. Learning from the experiences of FSU regarding the popularisation of innovation and cooperation with industry, based on competence and mutual trust, IPB will set the goal of twining some of their grant management tools and innovation models to its own Departments in order to become full support to the IPB’s researches, as BioQantSense project allows, as one of the project follow-up activities.