**AGREEMENT ON THE OPERATION OF THE ELI BEAMLINES FACILITY**

This agreement (‘Agreement’) was concluded on the day, month and year stated below by and between:

(1) The Extreme Light Infrastructure European Research Infrastructure Consortium

with registered seat at: Za radnicí 835, Dolní Břežany, 252 41

Identification number: 10974938

represented by: Allen Weeks, Director General

(hereinafter referred to as ‘ELI ERIC’); and

(2) Institute of Physics of the Czech Academy of Sciences, public research institution

with its registered office at: Na Slovance 2, Praha 8, PSČ: 182 21

registration no.: 68378271

represented by: RNDr. Michael Prouza, Ph.D., director

(hereinafter referred to as ‘FZÚ’)

(ELI ERIC and “FZÚ” are hereinafter jointly referred to as ‘Parties’ and individually as ‘Pa

WHEREAS

(A) ELI ERIC is a European Research Infrastructure Consortium incorporated under the provisions of the Council Regulation No 723/2009 of 25 June 2009 (hereinafter referred to as ‘ERIC Regulation’), Article 3(1) of which indicates that the principal task of an ERIC shall be to establish and operate a research infrastructure.

(B) Pursuant to Article 2(1) of the ELI ERIC Statutes, ELI ERIC shall operate as a single research infrastructure comprising the two Extreme Light Infrastructure Facilities (hereinafter referred to as ‘ELI Facilities’) located in the Czech Republic (Dolní Břežany) and Hungary (Szeged). Pursuant to Annex 1 to the Statutes, the ELI Facilities shall be made available to ELI ERIC through specific agreements within the conditions, and for the tasks and activities defined in Article 2 and Annex 1 of the ELI ERIC Statutes.

(C) FZÚ is a public research institution that is established under the Act no. 341/2005 Coll., on Public Research Institutions. The founder of FZÚ is the Czech Academy of Sciences, which is established under the Act no. 283/1992 Coll., on the Czech Academy of Sciences. FZÚ is the beneficiary of grants of the Ministry of Education, Youth and Sports of the Czech Republic for the projects “ELI: Extreme Light Infrastructure“, registration number CZ.1.05/1.1.00/02.0061 within the Operational Programme Research and Development for Innovations, “ELI: EXTREME LIGHT INFRASTRUCTURE – Phase 2”, registration number CZ.02.1.01/0.0/0.0/15\_008/0000162, within the Operational Programme “Research, Development and Education” and other projects financed either from the European Union or the Czech Republic (hereinafter referred to as “Projects”). Within the frame of the Projects, FZÚ has built a research infrastructure, ELI Beamlines, located at the address Za radnicí 835, Dolní Břežany, post code: 252 41, Czech Republic (hereinafter referred to as “ELI Beamlines Facility”). FZÚ is the sole owner of the ELI Beamlines Facility.

(D) The Parties wish to enter into a legal relationship that will allow ELI ERIC to achieve its objectives and facilitate the integration of the ELI Beamlines Facility into ELI ERIC.

(E) The Parties build upon the expressed common interest of the ELI ERIC members to fully integrate the ELI Facilities into a single organization, ELI ERIC.

IT WAS AGREED AS FOLLOWS:

1. BASIC PROVISIONS

1.1 Under the terms and conditions of this Agreement and in accordance with the ELI ERIC Statutes, FZÚ shall make available the ELI Beamlines Facility to ELI ERIC.

1.2 A detailed description of the ELI Beamlines Facility and of the timing under which its various elements are expected to be made available to ELI ERIC is provided for in Annex 1 to this Agreement. Annex 1 forms an integral part of this Agreement and, as such, is legally binding to both Parties.

2. DURATION AND PURPOSE OF THE AGREEMENT

2.1 This Agreement is concluded and regulates the rights and duties of the Parties during the Initial Operations Period specified in the ELI ERIC Statutes. The Initial Operations Period is understood as the period during which the ELI Beamlines Facility will gradually make its capabilities available to ELI ERIC, perform with ELI ERIC the activities involved in the operation of the ELI Beamlines Facility and prepare for the eventual handover of direct operational responsibility to ELI ERIC.

2.2 Both Parties pursue the objective that, at the end of the Initial Operations Period, ELI ERIC will be in a position to operate directly and fully the ELI Beamlines Facility. In view of this objective, the Parties shall make their best effort to achieve full integration of the ELI Beamlines Facility into ELI ERIC in accordance with Annex 1 to this Contract.

2.3 The Agreement shall terminate once both Parties have formally agreed that the purpose set forth in Article 2.2 has been fulfilled.

3. RIGHTS AND DUTIES, TASKS AND ACTIVITIES OF THE PARTIES

3.1 Within the framework of its statutory missions, ELI ERIC shall, among others:

3.1.1 Define the overall scientific and technology strategy for the ELI Beamlines Facility;

3.1.2 Facilitate and support effective and quality access to the ELI Beamlines Facility through the following actions:

(a) Develop and provide a single entry point common to the two ELI Facilities for interested users;

(b) Select users through an international peer-review system based on scientific merit and subject to feasibility, ethical compliance, and availability of resources as defined in the ELI ERIC Statutes and in the ELI ERIC Access Policy and related internal regulations;

(c) Define common standards and improve interoperability among the ELI Facilities;

(d) Exploit the full scientific potential of the ELI Beamlines Facility, by collaborating closely with user communities, developing and making available a set of complementary sources and instruments, providing efficient services and optimum conditions for users, and by undertaking outreach activities to new potential users;

3.1.3 Promote the dissemination to the research community, the industry, and the general public of the scientific results, publications, and the scientific-technical knowledge resulting from its activities, including through the definition of a policy and strategy for innovation and support to technology transfer and collaboration with the industry;

3.1.4 Make optimum use of resources and know-how by coordinating research and development of relevant technologies and by collaborating with multidisciplinary research communities and industry;

3.1.5 Provide and support training and facilitate mobility of researchers and technical and administrative personnel working at the ELI Facilities, define together with ELI Beamlines’ management specific rules aiming to competitively attract and retain highly qualified staff.

3.1.6 Ensure efficient internal and external communications and outreach activities, promoting and disseminating the scientific and technical results of the ELI Facilities;

3.1.7 Support and organise the integration of the ELI Facilities into ELI ERIC through the definition and implementation of an integrated management system supporting the operation of ELI ERIC as a single organization.

3.2 In the pursuit of the above and within the framework of this Agreement, ELI ERIC shall:

3.2.1 Cover the costs of operation of the ELI Beamlines Facility under the terms and conditions stipulated in Annex 1 to this Agreement either directly, by cash transfer or in-kind contribution made by the Czech Republic to ELI ERIC, subject to ELI ERIC IK management rules; the costs incurred under this Agreement shall be covered from January 1, 2022.

3.2.2 Cooperate with FZÚ to achieve the full integration of the ELI Beamlines Facility in ELI ERIC through activities aiming at the definition and implementation of an integrated management system under the conditions defined in Annex 1 to this Agreement.

3.3 FZÚ shall:

3.3.1 Provide necessary cooperation and support to ELI ERIC, so that the aforementioned rights, duties, tasks and activities are executed timely and properly;

3.3.2 Ensure the proper technical and organisational operation of the ELI Beamlines Facility in accordance with the specification provided in Annex 1;

3.3.3 Use the funding provided directly by ELI ERIC or by the Czech Republic intended to be accredited as an IK contribution in accordance with this Agreement, its Annex 1, and relevant ELI ERIC policies and regulations, and the principles of economy, expediency and efficiency to fulfil its duties under this Agreement and to achieve the purpose stipulated in this Agreement;

3.3.4 Support ELI ERIC in its monitoring and audit of the activities performed within the framework of this Agreement by complying with the reporting duties detailed in Article 6 and by providing ELI ERIC timely with complete information upon request as specified in Article 12.5.

3.4 Parties are aware that FZÚ, as the beneficiary of financial grants for Projects, is under the obligation to meet targets, milestones and goals defined by the grant decisions. While fulfilling this Agreement, the Parties shall respect such obligations of FZÚ and shall carry out this Agreement in such a manner that FZÚ is not exposed to any risks of failing to meet such obligations due to its obligations to ELI ERIC under this Agreement.

4. ELI ERIC REGULATIONS

4.1 To enable the integration of the ELI Facilities into a single organization, in line with Article 2(1) of the ELI ERIC Statutes, ELI ERIC and FZÚ will collaborate on the definition and implementation of an integrated management system.

4.2 FZÚ shall operate in compliance with the applicable Policies approved by the ELI ERIC General Assembly to the extent that they do not contravene the European legislation, the legislation of the Czech Republic or the liabilities of FZÚ related to the Projects.

4.3 Wherever relevant and necessary, FZÚ shall implement Processes, Procedures and Rules implementing the Policies referred to in Article 4.1. The latter Processes, Procedures and Rules shall apply only to the ELI Beamlines Facility.

4.4 ELI ERIC shall communicate to FZÚ the draft of any Policy it intends to issue that may affect the ELI Beamlines Facility and provide FZÚ with reasonable time to provide comments and check that the projected Policy does not contravene the European legislation, the legislation of the Czech Republic, or liabilities of FZÚ related to the Projects. Draft Policies will be submitted for approval to the ELI ERIC General Assembly by the ELI ERIC Director General after agreement with the Directors of the ELI Facilities within the framework of the ELI ERIC Management Board.

4.5 The Parties shall collaborate on the definition of the Processes, Procedures and Rules taking into consideration and building on the rules already in place at the ELI Beamlines Facility, while ensuring that they comply with the ELI ERIC Policies.

5. MONITORING

5.1 ELI ERIC shall have the right to control that FZÚ complies with its duties and makes use of the funding it provides in accordance with this Agreement.

5.2 For the purpose of Article 5.1, FZÚ shall provide ELI ERIC, at the request of ELI ERIC’s authorized representative, with any information or document related to activities falling within the scope of this Agreement, including accounting information. The requested information and documents shall be provided without undue delay, but in any case no later than 15 working days after the request has been notified to FZÚ in writing, unless otherwise agreed by the Parties. ELI ERIC is entitled to determine the form and the scope of such information, within reasonable boundaries and limited by the justified need for controlling and monitoring the fulfilment of FZÚ’s obligations and the use of funding provided directly by ELI ERIC or by the Czech Republic and intended to be credited as in-kind contributions under the Agreement.

5.3 If it is established by ELI ERIC that the funding is not used in accordance with this Agreement for reasons falling without any doubt under the responsibility and control of FZÚ and not falling under force majeure, ELI ERIC shall be entitled to reduce the funding provided by ELI ERIC. The amount of reduction shall correspond to the amount that was used in contradiction to this Agreement.

5.4 ELI ERIC shall exercise its monitoring powers under this Article reasonably, in accordance with the principles, processes, rules and guidelines for monitoring and auditing defined in the ELI ERIC Financial Rules and derived implementing regulations. and in any event under the principle of good faith and in areas relevant to the operations of ELI ERIC.

6. ANNUAL AND QUARTERLY REPORTS

6.1 FZÚ shall provide Annual and Quarterly Reports on fulfilment of the Operations Plan. The format, structure, and contents of the quarterly and annual Reports shall be agreed upon by both Parties.

6.2 FZÚ shall deliver by end of March of each year a written report to ELI ERIC that shall describe the annual activities of the ELI Beamlines Facility performed during the previous calendar year (hereinafter referred to as the ‘Report’).

6.3 Indicatively, the annual Report shall contain at least the following:

(a) information on the use of the funding allocated for the performance of this Agreement

(b) information on whether or not the targets and milestones, including those relevant to integration, listed in Annex 1 for the given calendar year were met;

(c) information on the potential risks identified during the given calendar year that could hinder or jeopardize the proper fulfilment of this Agreement or the full integration of ELI Beamlines Facility into ELI ERIC.

6.4 Annual and quarterly Reports may serve as a basis for discussion between the Parties regarding the fulfilment of this Agreement and, possibly, its modification or supplementation.

7. ACCESS ELI ERIC REPRESENTATIVES TO THE FACILITY

7.1 FZÚ shall allow and facilitate access to the premises of the ELI Beamlines Facility to the authorised ELI ERIC representatives.

7.2 ELI ERIC representatives visiting ELI Beamlines Facility must observe and respect all the safety, operational, and data protection regulations that apply to FZÚ’s employees and/or visitors.

7.3 Article 7.1 shall not apply to ELI ERIC employees whose place of work is at the ELI Beamlines Facility and for whom a separate office occupancy agreement has been concluded between ELI ERIC and FZÚ.

8. OWNERSHIP

8.1 The Parties declare and acknowledge that, under this Agreement, there shall be no transfer of ownership of the ELI Beamlines Facility or any of its part or its equipment from FZÚ to ELI ERIC.

8.2 During the duration of this Agreement, FZÚ is not entitled to transfer, pledge, lease (rent), or in any way encumber any of the tangible or intangible assets (hereinafter referred to as ‘Assets’) of higher value that belongs to the ELI Beamlines Facility without prior approval of ELI ERIC.

8.3 Assets of higher value are considered assets with a value exceeding 100,000 EUR.

8.4 To determine, whether or not assets, or management rights thereof belong to the ELI Beamlines Facility, the accounting criterion shall be used, i.e., assets listed on the balance sheet pertaining to the ELI Beamlines Facility shall be considered as assets belonging to, or managed by the ELI Beamlines Facility.

9. ELI ERIC PROPERTY

9.1 ELI ERIC is entitled to place its assets (hereinafter referred to as ‘ELI ERIC Assets’) at the ELI Beamlines Facility under conditions to be agreed upon by the Parties. This shall include agreement on the respective liabilities of the Parties and related insurance obligations.

9.2 FZÚ is entitled to use the ELI ERIC Assets in order to fulfil the activities falling within the scope of this Agreement under the agreed conditions referred to in Article 9.1.

10. DUTY OF CARE

FZÚ shall act in relation to the Assets and ELI ERIC Assets with the duty of care. In particular, FZÚ shall act in such a way that the Assets and ELI ERIC Assets are duly managed, trackable and identifiable, and maintained and that their value is not diminished excluding the normal depreciation due to intended use.

11. PROCUREMENT

11.1 ELI ERIC and FZÚ shall seek to define and implement procurement rules and procedures for the activities falling within the scope of this Agreement in such way to maximise the advantages granted to ELI ERIC under the ERIC Regulation.

11.2 ELI ERIC may authorize FZÚ to act on behalf of ELI ERIC when procuring goods, services or construction works which are necessary in order to fulfil the objectives of this present agreement. Such authorisation according to this Article shall have the form of a written power of attorney. Additionally, subject to prior agreement by FZÚ on a case-by-case basis, ELI ERIC may procure certain goods or products from FZÚ. In such a case, ELI ERIC shall specify what type of goods or products shall be procured by FZÚ and then supplied to ELI ERIC and under what terms and conditions. The ownership right to goods or products shall be transferred upon the acceptance of such goods or products by ELI ERIC.

11.3 When concluding public contracts within the meaning of Directive 2014/24/EU of 26 February 2014 on public procurement for procurements financed from the funding provided by ELI ERIC, FZÚ shall observe and follow relevant Czech legislation.

11.4 Within the framework of its Procurement Policy and Regulations (as foreseen in Article 12 of ELI ERIC Statutes), ELI ERIC may decide to set a financial threshold above which FZÚ shall obtain prior approval from ELI ERIC to conclude procurements.

11.5 FZÚ shall provide ELI ERIC each year, by the end of March, with the list of award procedures carried out in the previous calendar year and, by the end of July, with the procurement planned for the following calendar year in relation with this Agreement.

11.6 ELI ERIC is entitled to control and verify whether the provided funding was used in accordance with the Procurement Rules (hereinafter referred to as ‘Audit’). Such Audit may be carried out at the ELI Beamlines Facility. ELI ERIC shall determine the date of the Audit and shall inform FZÚ of such date and of the scope of the Audit at least 30 days in advance. ELI ERIC shall indicate, in particular, which award procedures carried out under the Public Procurement Rules shall be audited. During the Audit, FZÚ shall provide ELI ERIC’s authorised representatives with all the documents related to the award procedures that are necessary for the compliance assessment.

12. APPOINTMENTS TO KEY POSITIONS

12.1 The Parties shall seek agreement on appointing personnel to key positions, within the meaning of Article 12.2.

12.2 For the purposes of the preceding Article, is considered a key position any of the positions listed in Annex 1.

13. ACCOUNTS AND ACCOUNTING

13.1 FZÚ shall open a special (separate) account where the funding provided by ELI ERIC shall be managed.

13.2 The accounting of the ELI Beamlines Facility must be carried out separately.

14. TERMINATION OF THE AGREEMENT

14.1 This Agreement shall terminate at the end of the Initial Operations Period, subject to the agreement of both Parties and the formal acknowledgment by the ELI ERIC GA that the purpose of the Agreement has been fulfilled.

14.2 Either Party is entitled to unilaterally terminate this Agreement if it is substantially breached by the other Party and that such breach is not remedied within 120 days from the delivery of the notification to the Party who committed the breach by the other Party. Should be considered a substantial breach to this Agreement any breach of such nature and extent that the other Party would not have concluded this Agreement, if at the time of its conclusion knew that this Agreement would be breached in such manner by the other Party.

14.3 ELI ERIC is unilaterally entitled to terminate this Agreement, in any of the following situations:

14.3.1 an insolvency proceeding is initiated against the FZÚ;

14.3.2 this Agreement or any of its provision breaches the laws of the European Union or laws of the Czech Republic or the rules of funding prescribed by the Host national provider of the funding and such breach is not remedied by the modification of this Agreement within a period of 60 days from the delivery of the notification of such breach by the ELI ERIC to FZÚ.

14.4 FZÚ is unilaterally entitled to terminate this Agreement, in any of the following situations:

14.4.1 ELI ERIC fails to provide the funding for the costs of operation as stipulated in this Agreement and such failure has or may have a serious negative impact on the financial stability of FZÚ;

14.4.2 this Agreement or any of its provision breaches the laws of the European Union or laws of the Czech Republic or the rules of funding prescribed by the Host national provider of the funding and such breach is not remedied by the modification of this Agreement within a period of 60 days from the delivery of the notification of such breach by the FZÚ to ELI ERIC; or

14.4.3 the decision to wind up ELI ERIC has been adopted by the General Assembly of ELI ERIC.

14.5 If either Party unilaterally terminates this Agreement, it shall send to the other Party a written notification of such termination. The termination of this Agreement becomes effective on the day, on which the written notification of the termination was delivered to the other Party.

14.6 This Agreement may also be terminated by the agreement of both Parties.

15. DISPUTE RESOLUTION

15.1 All disputes arising out of this Agreement or out of legal relations connected with this Agreement shall be preferably settled amicably by mutual negotiation.

15.2 Courts of the Czech Republic shall eventually be competent to decide on disputes not settled by negotiation.

16. FINAL PROVISIONS

16.1 This Agreement shall be governed by the laws of the Czech Republic

16.2 Neither Party is entitled to transfer its claims against the other Party that shall arise on the basis or in connection with this Agreement onto third parties.

16.3 Neither Party is entitled to transfer its rights and duties under this Agreement or its part onto third parties.

16.4 All modifications and supplements of this Agreement must be in writing.

16.5 If any of provisions of this Agreement are invalid or ineffective, the Parties are bound to change this Agreement is such a way that the invalid or ineffective provision is replaced by a new provision that is valid and effective and to the maximum possible extent corresponds to the intent of the original invalid or ineffective provision.

16.6 In accordance with the General Data Protection Regulation (EU) 2016/679, the Parties acknowledge that personal data obtained by them during the performance of this Agreement shall be data strictly necessary for its performance and may only be applied or used to fulfil the purpose of the Agreement. The Parties shall take all necessary technical and organisational measures in order to guarantee the security of personal data and prevent such data from being altered, lost, processed or accessed without authorisation, in view of the state of technology, the nature of the data furnished and the risks to which it is exposed, whether due to human action or the physical or natural environment.

16.7 This Agreement is executed in four (4) copies and every Party shall receive two (2) copies.

16.8 This Contract shall be valid on the day, on which it was signed by both Parties, and effective on the day, on which it was published in the Register of Contracts within the meaning of the Act no. 340/2015 Sb., on the Register of Contracts.

IN WITNESS WHEREOF attach Parties their handwritten signatures:

ELI ERIC FZÚ

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name: Allen Weeks Name: RNDr. Michael Prouza, Ph.D.

Position: Director General Position: Director

Date: Date:

**Annex 1 – Technical Annex**

# **SCOPE AND PURPOSE OF ANNEX**

This Annex further details the conditions under which this Agreement shall be implemented. It forms an integral part of the Agreement and, as such, is legally binding to both Parties.

Having regard to Article 1.2 of the Agreement, this Annex provides a detailed description of the ELI Beamlines Facility and the timing under which its various elements are expected to be made available to ELI ERIC as well as the conditions under which the latter shall be accepted by ELI ERIC.

Having regard to Article 3.2.1, this Annex specifies the terms of conditions for the financing of the costs of operation of the ELI Beamlines Facility, either directly, by cash transfer or in-kind contribution made by the Host Member to ELI ERIC, subject to ELI ERIC IK management rules, and the conditions under which those funds shall be used.

Having regard to Article 2.2 and 3.2.2 of the Agreement, this Annex specifies the arrangements for the pursuit by the two Parties of the objective that, at the end of the Initial Operations Period, ELI ERIC will be in a position to operate directly and fully the ELI Beamlines Facility.

Finally, having regard to Article 3.3.2, this Annex specifies the conditions for the proper technical and organisational operation of the ELI Beamlines Facility.

# **DESCRIPTION OF ELI BEAMLINES Facility**

For the purpose of this Agreement, the scope of the ELI Beamlines Facility to be made available to ELI ERIC is understood as comprising the experimental capabilities (lasers, secondary sources and end-stations) as described in Annex 1 to the ELI ERIC Statutes, as reproduced below under Section 2.1. This is complemented in Section 2.2 by a description of workshops and laboratories supporting operations and user access.

Any amendment of the scope of the ELI Beamlines Facility described in Section 2.1 shall be subject to prior approval by the ELI ERIC General Assembly as per Article 25(9), item p) of the ELI ERIC Statutes.

## ***Facility and experimental capabilities***

The ELI Beamlines Facility in Dolní Břežany, near Prague (Czech Republic), even in its name, underlines its capability to support multiple, different experiments for a range of Users, offering the availability of various laser lines. It is designed to offer a high-energy and high repetition-rate capabilities. It is a single-site, greenfield facility occupying more than 30,000 hectares.

The facility is owned and managed by the Institute of Physics of the Czech Academy of Sciences, which has full autonomy and legal personality in the Czech Republic.

The ELI Beamlines facility will be the most multifunctional of all existing and projected laser facilities. It is designed not only to serve researchers who specialize in laser science, but it will also accommodate researchers from other fields such as material sciences and engineering, medicine, biology, chemistry, and astrophysics. With this variety in its research activities, it is expected to deliver significant benefits to society in the medium and long term.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PRIMARY LASER SOURCES | | Peak power | Energy in pulse | Pulse duration | Repetition rate |
| ELI Beamlines | L1 | >5 TW | 100 mJ | < 20 fs | 1 kHz |
| L2 OPCPA, Dual color | 100 TW | 1J OPCPA /1mj MIR | ≤ 20 fs | 20 Hz |
| L3 | ≥ PW | ≥ 30 J | ≤ 30 fs | 10 Hz |
| L4f | 10 PW | ≥ 1.5 kJ | ≤ 150 fs | 1 shot per min |
| L4n |  | ≥ 1.5 kJ | ns | 1 shot per min |
| Astrella |  | 6 & 10mJ | 20 fs | 1 kHz |
| Bio-laser |  | 6 mJ CEP stabilization | 20 fs | 1 kHz |

**Table 1 –** ELI Beamlines Performance Parameters for Laser Sources

The specific goal of ELI Beamlines, as endorsed in the ELI ‘White Book’, is to develop a ‘High-Energy Beam Facility, responsible for development and use of ultra-short pulses of high-energy particles and radiation stemming from relativistic and ultra-relativistic interactions’, as well as to address one of the ‘Grand Challenges’ listed in it, specifically in the generation of ‘Ultra-short pulses of energetic particles (>10 GeV) and radiation (up to few MeV) beams produced from compact laser plasma accelerators’.

Furthermore, there is a very strong emphasis on possible applications in different fields of societal relevance like for instance medicine or biology. ELI Beamlines, together with the connected HiLASE Centre dedicated to the laser technology development and transfer, which already serves as an attractor for companies and spin-offs in different fields installed in the so-called STAR region (Science and Technology Advanced Region) which is surrounding the ELI Beamlines facility, creates the favourable environment for intensive cooperation between research and industry.

Diagram

Description automatically generated

**Figure 1** – Layout of ELI Beamlines Facility

The ultrashort and ultra-intense pulses of light and the particles generated ELI Beamlines from interaction with solid state and gas target materials will allow a broad spectrum of projects in fundamental and applied research in chemistry, biology, medical technologies, development of new materials, and other areas. The research activities within the ELI Beamlines project are structured into six experimental halls where stations are placed to address the Experimental hall E1 will house laser-driven secondary sources and experimental end-stations for applications in molecular, bio-medical, and materials sciences. Experiments will exploit synchronized laser photon beams in the VUV and hard X-ray range. Instruments include:

|  |  |
| --- | --- |
| Secondary Sources – ELI Beamlines | Source |
| E1: X-Ray Sources | HHG |
| E1: X-Ray Sources | PXS |
| E2: X-Ray Sources | Betatron |
| E2: X-Ray Sources | Compton |
| E4: Ion Acceleration | ELIMAIA |
| E5: Laser Undulator Illuminating Source | LUIS |
| E5: Electron Accelaration | ELBA |

**Table 2** – ELI Beamlines Secondary Sources

|  |  |
| --- | --- |
| Experimental hall – ELI Beamlines | Station |
| E1: Material and Biomolecular Applications | MAC |
| E1: Material and Biomolecular Applications | Trex |
| E1: Material and Biomolecular Applications | SRS |
| E1: Material and Biomolecular Applications | ELIps |
| E2: X-Ray Source – Betatron source | Gammatron station |
| E2: X-Ray Source – Compton source | Compton stations |
| E3: Betatron Source | P3 |
| E3: Plasma Physics Platform | P3 |
| E4: Ion Acceleration | ELIMED |
| E5:  Laser Undulator Illuminating Source | LUIS Station |
| E5: Electron Accelaration | ELBA Station |

**Table 3** – ELI Beamlines Experimental Stations

* MAC: a Multi-purpose chamber for Atomic, molecular, and optical sciences and Coherent Diffractive Imaging.
* ELIps: VUV ellipsometer for sub-ps experiments; an end-station for VUV and soft X-ray materials.
* Hard X-ray end-station: A modular station for Time Resolved Experiments such as scattering, diffraction, spectroscopy and imaging with X-rays.
* Optical probes and pump beams: An advanced station for optical spectroscopy, including stimulated Raman scattering; the source for a wide array of synchronized pump beams from UV to IR and THz.

The experimental hall E2 is dedicated to ultrafast and bright, hard X-ray beams. A PW-class laser will be available at a 10 Hz repetition rate. A range of parameters may be adjusted including laser intensity, laser spot size and duration, and electron density in the gas. Electrons are accelerated to relativistic energies and wiggled by the plasma itself (Betatron source) or by a second laser pulse (Compton source). Intense femtosecond X-ray or gamma-ray beams are emitted by a micron-size source. Users may request narrow spectrum (10% energy spread) or broadband radiation in a spectral range from keV to a few MeVs.

The plasma physics platform located in the experimental hall E3 is a multi-functional experimental infrastructure designed to perform laser-plasma and laser-matter interaction research predominantly on the following topics:

* High energy density physics (HEDP)
* Warm dense matter (WDM)
* Plasma optics (PO)
* Laboratory astrophysics (LA)
* Ultra-high intensity interaction (UHI).

The E4 experimental area allows users to test various samples with laser accelerated ion sources because of its ion beam transport and dosimetry section, as well as to investigate innovative schemes for laser-driven ion acceleration that can be accommodated in the flexible interaction chamber.

The E5 experimental hall contains the LUX beam line and is dedicated to users interested in the irradiation of various samples through the most advanced techniques. It also houses the ELBA platform, a flexible experimental area dedicated to users who want to test innovative concepts and use the most advanced technologies for accelerating electrons with lasers at multi-GeV levels.

The confirmation and acceptance of each experimental station will be monitored and a formal ‘Operational Acceptance Review’, consisting of independent experts, experts from ELI Beamlines, and experts from the other ELI Facilities will confirm readiness for users and make a formal recommendation to the ISTAC and to the ELI ERIC GA.

## ***Workshops and laboratories***

The ELI Beamlines Facility supports operations with the following faciltiies, laboratories and workshops:

* High power computing clusters – SUNRISE (ELI II Building) and ECLIPSE - provide computational resources for scientists and engineers who work at the ELI facility as well as for ELI’s users who may benefit from computer simulations.

ELIBIO Laboratory - advanced biological laboratory, including dedicated laser laboratory, optical nad electron microscope, BSL2 facilitiy

* Biochemical and chemical Laboratory
* RADLAB -  is a laboratory dedicated for radiation protection purposes.
* Integration Control Systems Laboratory - Primary tasks of the lab are acceptance testing and commissioining on experimental setups control hardware before they final cleaning and integration to beamlines endstations.

Optical Laboratories - labs for preparation of optical components and setups.

* ISO5 laboratory - used to clean and verify optics and optomechanics
* Target Laboratory - he main goals of the TargetLAB are fabrication, characterization, handling and assembly of various types of targets being investigated during experimental research campaigns within ELI Research Programs.
* Metrology Laboratory
* Opto-mechnical Workshop -the workshop serves for assembly, adjustment and testing of optomechanical devices prototypes. It is used for metrology of optomechanical devices, acceptance tests, cleaning, repairs and maintenance.
* Electronical engineering workshop – serves to design manufacturing, testing of lectrical and electronic devices.
* Vacuum workshop – serves for testing various vacuum related devices, such as gauges, pumps, valves, and components that are used in vacuum environment.
* Mechanical workshop (ELI II Building) provides capability for ih-house manafacturing of complex components such as beam transport mounts and experimental set-ups.

# **SCHEDULE OF FACILITY COMMISSIONING AND CONDITIONS OF ACCEPTANCE OF SYSTEMS BY ELI ERIC**

## ***Facility Commissioning Schedule***

As of the signature date of this Agreement, the schedule for commissioning and making available the experimental capabilities for operations under ELI ERIC described in Section 2.1 is as shown below in Tables 4, 5 and 6.

This schedule shall not be interpreted as binding to the Parties. It shall be used as an indicative reference baseline for the planning of user access activities, to be approved as part of the ELI ERIC annual activity plan by the ELI ERIC General Assembly.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **LASER** | **Peak power** | **Energy** | **Pulse duration** | **Repetition rate** | **Status 11/2021** | **Expected date for user access** |
| **L1 ALLEGRA** | >5 TW | 100 mJ | < 20 fs | 1 kHz | 55 mJ demonstrated, 30mJ Available to users |  |
| **L2 DUHA** | 100 TW | ≥3J OPCPA /1mJ MIR | ≤ 20 fs | 20 Hz | Under developement – upgrade project ADONIS | 2023 |
| **L3 HAPLS** | ≥ PW | ≥ 30 J | ≤ 30 fs | 10 Hz | 16J / 3.3 Hz supporting commissioning experiments, Available to users |  |
| **L4f ATON** | 10 PW | ≥ 1.5 kJ | ≤ 150 fs | 1 /min | 1.5 kJ demonstrated,  10 PW Compressor in commissioning | 2023 |
| **L4n** |  | ≥ 1.5 kJ | ns | 1 /min | 1.2kJ 1 shot per 3 minutes demonstrated, Available to users |  |
| **L4P** | ≤1 PW | 150 J | 150 fs-150 ps | 1 /min | Under developement | 2024 |
| **Astrella, Legend** |  | 6 & 10mJ | 20 fs | 1 kHz | Available to users |  |
| **Bio-laser** |  | 6 mJ CEP stabilization | 20 fs | 1 kHz | Available to users |  |

**Table 4** – Commissioning schedule for laser systems of ELI Beamlines Facility

|  |  |  |  |
| --- | --- | --- | --- |
| SECONDARY SOURCE | Source | Status | Expected date for user access |
| E1: X-Ray Sources | HHG | Available to users |  |
| E1: X-Ray Sources | PXS | Available to users |  |
| *E2: X-Ray Sources – funded upgrade* | *Compton* | Under development | 12/2022 |
| *E3: X-Ray Sources* | *Betatron* | In commissioning | 3/2022 |
| E4: Ion Acceleration | ELIMAIA | Available to users |  |
| E5: Laser Undulator X-Ray Sources | LUIS | In commissioning | 6/2022 |
| E5: Electron Accelaration | ELBA | In commissioning | 7/2022 |

**Table 5** – Commissioning schedule for secondary sources of ELI Beamlines Facility

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental station | STATION | Status | Expected date for user access |
| E1: Structural Dynamics | MAC | Available to users |  |
| E1: Structural Dynamics | Trex | Available to users |  |
| E1: Structural Dynamics | SRS | Available to users |  |
| E1: Structural Dynamics | ELIps | Available to users |  |
| E2: X-Ray Sources – *funded upgrade* | Compton Station | Under development | 12/2022 |
| E5: Laser Undulator X-Ray Sources | LUIS Station | Under development | 6/2023 |
| E3: Plasma Physics Platform | P3 | In commissioning | 3/2022 |
| E4: Ion Acceleration | ELIMED | In commissioning | 2/2022 |
| E5: Electron Acceleration | ELBA Station | In commissioning | 12/2022 |

**Table 6** – Commissioning schedule for experimental stations of ELI Beamlines Facility

Notes:

* Commissioning shall be understood as the set of activities performed by the ELI Beamlines Facility to qualify a system up to a level of operational readiness considered sufficient for delivering access to peer-reviewed external users under ELI ERIC.
* The date of availability to the ELI ERIC users shall be understood as the date on which the ELI Beamlines Facility forecasts that a specific experimental capability will be ready for acceptance by ELI ERIC as defined in Section 3.2.

## ***User Access Plans***

User access plans shall be defined on an annual basis under the conditions and timing specified by ELI ERIC. They shall be approved by the ELI ERIC General Assembly together with the annual budget no later than 30 November of the preceding calendar year.

User access plans shall include at a minimum the list of systems expected to be available to ELI ERIC for user access, the expected user-relevant parameters of those systems, the indicative timing of the calls for proposals for each system, and an estimate of the amount of beamtime available for each call.

## ***Technology qualification and User Operations Readiness Acceptance***

The experimental capabilities (lasers, secondary sources, and end stations) specified in Section 2.1 shall be subject to individual acceptance reviews by ELI ERIC to qualify them as ready for user operations under ELI ERIC.

Acceptance reviews shall, in principle, be organised prior to the opening of the first call by ELI ERIC for user access for the system(s) subject to acceptance. Unless otherwise agreed by the two Parties, the acceptance review shall be held no later than 4 weeks prior to the expected date of opening of the call.

Each individual acceptance review shall be organised based on an acceptance protocol agreed by the two Parties.

# **Financial aspects**

## ***Costs of Operation of the ELI Beamlines Facility***

The table below shows the estimated costs of operation of the ELI Beamlines Facility for the period 2022-2026. These costs have been defined consistently with the costing methodology used for the estimation of the ELI ERIC operational costs shown in Annex 2 to the ELI ERIC Statutes and are consistent with the scope and timing of availability of the ELI Beamlines Facility shown in Sections 2.1 and 3.1 of this Annex.



**Table 7** – Costs of operation of the ELI Beamlines Facility for the period 2022-2026

## ***Budget Implementation***

The costs financed by ELI ERIC shall be approved on an annual basis as part of the ELI ERIC budget by the ELI ERIC General Assembly together with the annual activity plan.

The planning and implementation of the annual budget of the ELI Beamlines Facility financed by ELI ERIC shall be carried out by the two Parties in accordance with this Agreement and with the ELI ERIC Financial Rules and applicable provisions of the Internal Financial Manual.

In the event that ELI ERIC receives any indication at any time during the duration of this Agreement that the funding available to ELI ERIC for financing the costs of operation of the ELI Beamlines Facility for a given year shall be lower by more than 10% than the costs of operation foreseen in Table 7 for that given year, ELI ERIC shall immediately inform the other Party. In such a case, both Parties shall seek a solution to mitigate the expected reduction of funding.

## ***Cash-flow***

Annual budgets approved by the ELI ERIC General Assembly shall specify the amount of financing to be made available cash and in-kind for the operation of the ELI Beamlines Facility.

Unless otherwise agreed by the two Parties, funding for the operation of the ELI Beamlines Facility to be made available cash as per the approved budget will be transferred by ELI ERIC to the ELI Beamlines Facility on a quarterly basis.

Transfers will be made under conditions of amounts and schedule agreed upon by both Parties following the approval of the annual budget taking account the cash requirements and liquidity of ELI ERIC and the other Party.

FZÚ shall be entitled to issue an invoice for services on the following dates: 15 February, 15 May, 15 August and 15 October, those dates being understood as dates of taxable supply.

# **OPERATIONS**

## ***Operations***

Operations shall be performed by ELI Beamlines according to a Facility Operations Plan to be prepared by the ELI Beamlines Facility and approved by ELI ERIC. The Facility Operations Plan shall be developed in accordance with a template adopted by ELI ERIC, in consultation with the ELI Beamlines Facility.

In accordance with Article 12 of this Agreement, the Parties shall seek agreement on appointing personnel to the following key positions: Facility Director, Department Heads or equivalent thereto, such as Scientific Director, Technical Director, Research Program Leaders and Administrative Manager. The ELI Beamlines Facility shall seek agreement with ELI ERIC on the terms of reference of the aforementioned positions and involve ELI ERIC representatives appointed by the ELI ERIC Director General in the evaluation of qualified candidates.

## **Organisation of user access**

Access shall be managed and organised by ELI ERIC according to the User Access plan of the ELI Beamlines Facility in accordance with the ELI ERIC Access Policy and with the processes and other procedures and rules implementing that Policy.

Both Parties commit to collaborate on the development of an integrated management system for the management of access, in accordance with the Access Policy.

# **LEGAL and management integration**

While ELI ERIC is mandated to manage access to the ELI Beamlines facility as it is made available, all assets of the Facility are owned and managed directly as of the signature of this Agreement by Host Institution.

In accordance with Article 2.2 of this Agreement, both Parties pursue the objective that, at the end of the Initial Operations Period, ELI ERIC will be in a position to operate directly and fully the ELI Beamlines Facility.

The Parties shall make their best effort to achieve integration of the ELI Beamlines Facility into ELI ERIC by 1st January 2023 having regard to the organisational milestones included in Annex 1 of the ELI ERIC Statutes.

The ELI Beamlines Facility and ELI ERIC Director General shall report on each meeting of the General Assembly on progress with the legal integration.