EUROPEAN PLASMA RESEARCH ACCELERATOR WITH EXCELLENCE IN APPLICATIONS



# Kick-off meeting: WP16

Alexander Molodozhentsev / ELI Beamlines Rajeev Pattathil / STFC - UKRI Leonida Gizzi / CNR





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## **Preparatory Phase - WP16**







#### Main Objective of WP16 / duration 48m : Define 2<sup>nd</sup> construction site → TDR for Laser-driven Facility

### As one of the TECHNICAL WPs of PP, WP16 should:

- Update of CDR concepts and parameters aiming technical design of the Laser-Driven Facility;
- Specify in detail Excellence Centers and their required funding: TDR related R&D, prototyping ... <u>urgent action</u>

#### WP16 steering Committee:

Alexander Molodozhentsev / ELI Beamlines – IP ASCR Rajeev Pattathil / STFC - UKRI

#### WP16 members:

Alexander Molodozhentsev / ELI Beamlines – IP ASCR Rajeev Pattathil / STFC – UKRI Leonida Gizzi / INO – CNR Hans-Dieter Hoffmann / FRAUNHOFER Open to additional participation

## **Laser-Driven Construction Site: requirements**





Alexander Molodozhentsev (WP16) / EuPRAXIA PPP Kick-Off meeting / Nov.24-25, 2022

**E**<sup>t</sup>**PR**<sup>A</sup>**XI**A

## **Preparatory Phase - WP16 & WP3**



#### WP3 (Organization and Rules) Deliverables:

- **D3.1** Criteria and methodology for EuPRAXIA Site#2 selection (Laser-driven Facility)
- **D3.2** -- Report on the <u>decision on</u> the EuPRAXIA Site#2

Start: 11.01.2022	6m	12m	16m	18m	20m	30m	36m	42m	48m
				D3.1	D3.2				
				Public report	Public report				
				Apr.2024	June 2024				

#### WP16 Deliverables:

**E**ú**PRA** 

**D16.1** -- Update on EuPRAXIA plans for <u>selected</u> Site #2 (Laser-driven Facility)

**D16.2** -- Report on TDR status for EuPRAXIA Site #2

#### + Milestone Report: Review of candidate sites proposals

Start: 11.01.2022	6m	12m	16m	18m	24m	30m	36m	42m	48m
			MSR		D16.1			D16.2	
			Report		Public report			Public report	
			Feb.2024		Oct.2024			Apr.2026	





#### **Objectives:**

- Evaluation of requirements for potential site of Laser-Driven EuPRAXIA pillar
- Evaluation of a readiness of candidates to accommodate the Laser-Driven EuPRAXIA pillar
- Identification of a site for Laser-Driven EuPRAXIA pillar
- Identification of <u>possible funding resources</u> for the technical realization of the Project
  - $\rightarrow$  Financial Board of Sponsors for guidance on science-political, funding aspects

#### **General characteristics and requirements** for the EuPRAXIA Site#2 (Laser-Driven pillar) selection / EuPRAXIA CDR:

- Site#2 shall be at a laboratory with existing infrastructures (RF accelerators, laser installations and user access);
- Site#2 shall have existing groups in place to address all safety requirements and rules;
- Site#2 shall provide a space depending on the choices during the preparatory and technical design phases
- Site#2 shall provide the required services and facilities for the support of external users.

#### Selection rules will be determined by WP3 in collaboration with WP16.

#### Candidates to accommodate the EuPRAXIA Site#2 (Laser-Driven pillar) / EuPRAXIA CDR:

- EPAC UKRI (UK)
- ELI Beamlines (CZ)
- CNR-INO (Italy)
- INFN-LNF (Italy)

+ EuPRAXIA Excellence Centers





### **Candidate 1: EPAC (UK)**

- A new £88M UK facility for applications of laserdriven plasma accelerators
- Will produce LWFA driven beams at 1PW, 10Hz: Expected up to 10 GeV electron beams – good test bed for EuPRAXIA (de-risking several concepts)
- Building completed; installations ongoing; first operations in 2025
- Additional space for future laser and experimental areas (eg. a 100Hz system under development)
- Has the capacity to expand the EPAC building to house the additional beamlines – EuPRAXIA @ EPAC





#### Courtesy R.Pattathil



## **<u>Candidate 2:</u>** ELI-Beamlines (Czech Republic)



L3-HAPLS



### **Candidate 3: CNR (Italy)**



#### 100 Hz, J-scale laser beamline

Funded by the European Union NextGenerationEU



- EuPRAXIA Advanced Photon Sources (EUAPS) project (NG-EU, INFN-CNR-UTV)
- Photonics and Quantum Science (IPHOQS) project (NG-EU, CNR, POLIMI, LENS)



EUAPS WP2: High average power, high repetition rate laser beamline: 4.8 M€ IPHOQS A3.6 Ultrafast, high repetition rate radiation beamlines: 1.4 M€ *IPHOQS A3.5:* High Intensity, extreme laser beamlines: 1.5 M€

CNR-INO

ÉUAPS.

**IPHOQS** 



### **Candidate 4: INFN (Italy)**

#### SPARC\_LAB:

- X-band LINAC development
- Compact PWFA-based FEL program
- LWFA research program
- Betatron radiation source



Courtesy M.Ferrario





### **<u>REVIEW of Candidate sites</u>** → Milestone Report (Deadline: Feb. 2024)

#### EuPRAXIA – ELI Beamlines workshop Oct.13-14, 2022

https://indico.eli-beams.eu/event/442/attachments/ 940/1329/EuPRAXIA\_ELI\_Beamlines\_programme\_fin\_fin.pdf



Similar workshops (visits) have to be organized during 2023 at different Research Centers considered as candidates to host EuPRAXIA Site#2 (LPA-based Facility) to review:

- current status of the Center's development
- R&D program
- readiness to accommodate Site#2

PLACE	TIME
EPAC - UKRI (UK)	September 2023
ELI-Beamlines (CZ)	October 2023
CNR (Italy)	November 2023
INFN (Italy)	November 2023

Preliminary plan



## **Preparatory Phase - WP16**



#### **EuPRAXIA Excellence Centers: present status**

LAPLACE \* – France: Excellence Centre for Laser-Plasma Acceleration and 1 GeV Free-Electron Laser (FEL)
IST – Portugal: Excellence Centre for Plasma Simulations and Theory
PWASC \* – UK: Excellence Centre for Advanced Application Beamlines
ELI Beamlines – Czech Republic: Incubator for the Application of Novel Accelerator Technology to Laser Science Users
DESY – Germany: Excellence Centre for Plasma Accelerators and High-Repetition-Rate Developments

\* National consortium

All EuPRAXIA Excellence Centers shall be involved in the WP3-WP16 activity to select EuPRAXIA Site#2

→ Subject to further work and development in the PP project

