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APPLICATIONS

EuPRAXIA
Preparatory Phase

Update on the status of the 2nd site selection procedure

Pierluigi Campana, Andrea Ghigo, Arnd Specka

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WP3: Deliverables and Milestones

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Milestones:

M3.1 Benchmark of comparable RI organisational models (M18)

M3.2 Organisational requirements: requirements for internal procedures and tasks (M28)

M3.3 Responsibilities breakdown (M32)

Deliverables

DEL3.1 Report (R) on the decision for the 2nd Site (M18)

DEL3.2 Report (R) on the distributed RI Concept, including organization and rules (M42)

visits to 2nd (=LPA) site candidates

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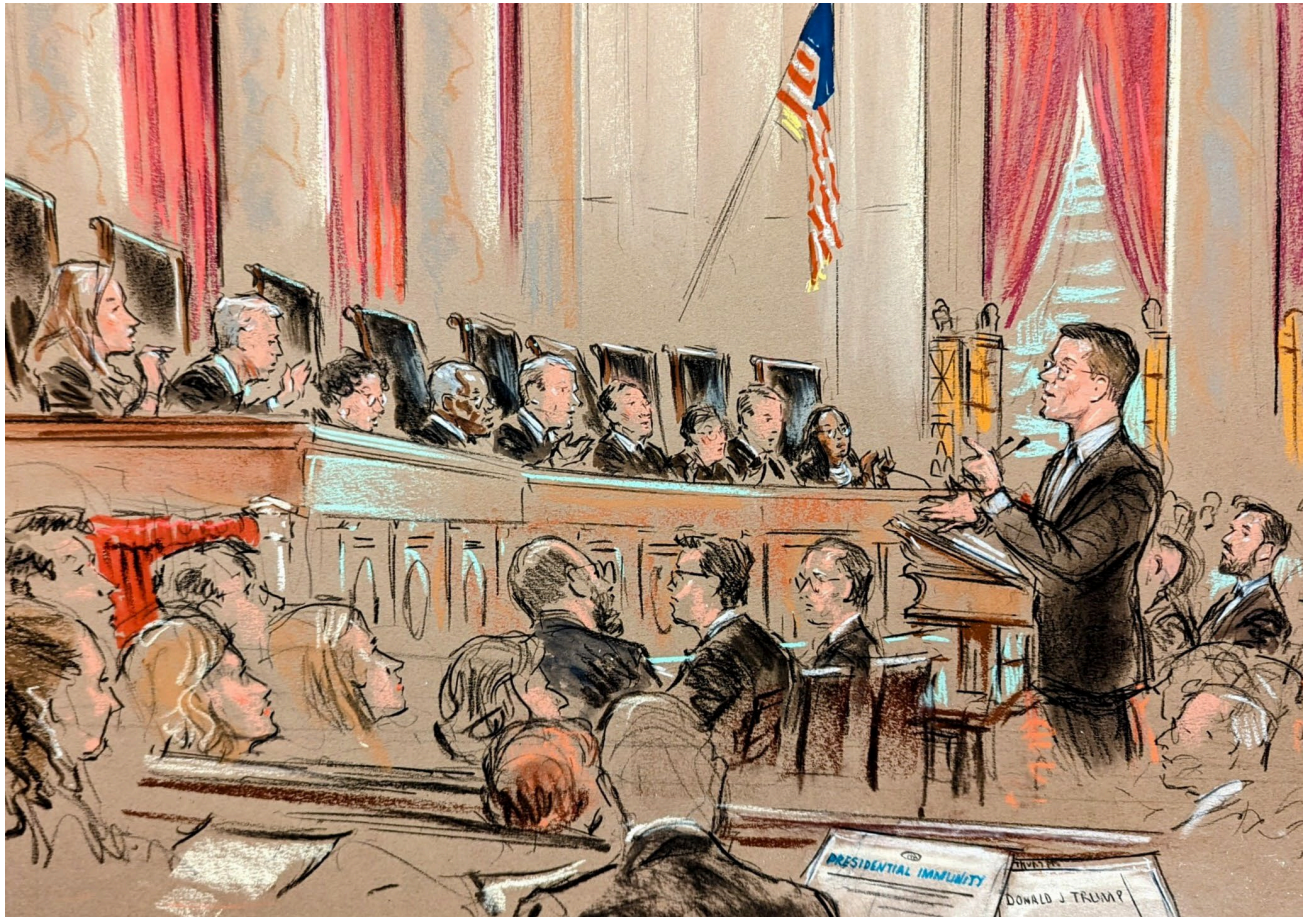
- **collegiate selection process**
- clarification of the **role of non-host partners** : codeveloper-user v/s extra-disciplinary end-user
- **internal panel =** representatives of the candidate sites + EuPRAXIA management
  to be nominated officially soon (June 24)
  will elaborate a procedure proposal for approval to the Sept. 2024 CB Elba.
- Schematically, the procedure should identify a “tool” **for 2nd site assessment:**
  - general criteria for hosting an international research infrastructure
  - more precise criteria for the LPA specific technical characteristics
- **Aims:**
  - completion of the process by a special CBMeeting in February-March 2025.
  - viable proposal before the end of the preparatory phase
  - avoid unnecessary multiplication of work on the related TDR.
- **Accessible funding to be identified**

2nd site selection PANEL



2nd site selection panel (nominated june 2024)

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- Ralph Assmann (GSI): former EuPRAXIA-PP project leader
- Pierluigi Campana (INFN): EuPRAXIA-PP project leader
- Massimo Ferrario (INFN): head of Sparclab (1st site)
- Antonio FALONE (INFN): WP2 co-coordinator
- Andrea Ghigo (INFN): WP3 co-coordinator
- Arnd Specka (CNRS): WP3 co-coordinator
- Giancarlo Gatti (CLPU, Salamanca)
- Leo Gizzi (CNR, Pisa)
- Alexander Molodozhentsev (ELI BL, Prague)
- Rajeev Pattathil (EPAC, Rutherford Lab, Didcot)

Bid-Book template: purpose

- **uniformization** of format for **COLLEGIATE assessment** of hosting capabilities
- identification of **synergies** with the beam driven site
- evaluation of needs **for in-kind 3rd country contributions** (“exc. centers”)
- **costing**: existing and to-be-built infrastructure
- tool for consultation for green light with host countries **funding agencies**
- speed-up towards initiating **TDR**
- Most of the work already done in Milestone report 16.1 (contains freeform detailed description of candidates sites)
- **COMPACT DOCUMENT:**
  - **Layout description of the EuPRAXIA laser-driven facility**
  - **(min. 10 p., max. 20 p excluding references but including figures)**

Baseline Scenario for 2nd Site Assessment

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Baseline scenario of original proposal

- Phase 1:
  laser-driven 1 GeV plasma FEL (20 Hz, 30 pC) as requirement for initial operation:
- **Phase 2**:
  Upgrade plan to 100 Hz, to 5 GeV FEL
- **Beneficial in review**: Additional applications & user beamlines (time plan & resource needs), test plan for 2 stage plasma acceleration

	Laser-driven
Phase 1	✓FEL beamline to 1 GeV + user area 1 ✓Ultracompact positron source beamline + positron user area
Phase 2	✓X-ray imaging beamline + user area ✓Table-top test beams user area ✓FEL user area 2 ✓FEL to 5 GeV
Phase 3	✓High-field physics beamline / user area ✓Other future developments

Bid-Book template

The requested document should contain TABULAR information on the hosting infrastructure such as:

- the number and expertise of the staff,
- financial capacity to support the operation,
- budget to implement the EuPRAXIA RI
- available space to implement the infrastructure.

as well as technical information on existing or proposed equipment such as:

- Laser parameters and characteristics,
- electron beam parameters
- Undulator and FEL photons specifications
- Photon beam lines and end stations description

Host facility criteria: EXPERTISE

EXPERTISE
Local Support and Expertise: The presence of local expertise in laser plasma acceleration and related fields is pivotal for project success. Evaluating the availability of skilled personnel, research institutions, universities, and industry partners who can contribute to the project and provide ongoing support is crucial fo leveraging local resources and fostering collaboration.
Does the lab have expertise in:
high power laser technology
electron beam optics and handling
X-ray optics and applications
operation of FEL/Synchrotron/Accelerator facilities
laser and radiation safety
data management
user access management

Host facility criteria : OPERATION

OPERATION
Technical Support: Evaluating the availability of skilled technical staff and support services ensures smooth operation and maintenance of laser plasma facilities, enhancing research productivity and project efficiency.
total number of people working in the lab
total number of people who will work on EuPRAXIA
number of people dedicated to laser maintenance
number of people dedicated to equipment user operation
number of people dedicated to beam lines
number of hours dedicated to EuPRAXIA users per year
number of hours dedicated to machine development per year

Host facility criteria: INFRASTRUCTURE

INFRASTRUCTURE
Experimental Infrastructure and Facilities: This includes analyzing the necessary infrastructure to support successful operation of the facility including the extent of land area suitable for construction and future expansion. Evaluating the readiness of experimental infrastructure components, such as beam lines, vacuum systems, cooling systems, target systems, and radiation shielding, and the effective support and safety of laser plasma acceleration experiments.
size of existing infrastructure (in kind)
space available for electron beam line
space available for laser and plasma chamber
space available for undulator
space available for beam line(s) & end-station(s)
infrastructure for data handling
planned extension of the infrastructure into available spaces
planned extension of infrastructure into spaces to be acquired

COSTING

BUDGET
Funding and Cost Considerations: Assessing the availability of funding sourc specific to laser plasma research is essential for project sustainability. This inclu evaluating construction costs, operational expenses, and the overall financial via ity of each candidate site to ensure adequate support for long-term project succe
value of existing infrastructure construction made available to EuPRAXIA
value of existing electron beam line made available to EuPRAXIA
value of existing laser & plasma chamber made available to EuPRAXIA
value of existing undulators made available to EuPRAXIA
value of existing beam line(s) and end station(s) made available to EuPRAXIA
value of existing manpower available for new infrastructure set-up
new budget in manpower for new infrastructure set-up
new budget for new infrastructure construction (building, shielded area….)
new budget for new equipment (electron beam line, laser, undulators, beam line end-station(s)
budget for yearly operational cost (spare parts, consumable, etc…)
budget for yearly operational cost (manpower)

Technical criteria: LASER

LASER
Laser Infrastructure: Evaluation of existing/planned laser infrastructure capab ties, including energy, repetition rate, pulse duration, and beam quality, is critica for driving laser plasma acceleration effectively and achieving desired research comes.
laser type
energy per pulse (existing/planned)
repetition rate (existing/planned)
pulse duration (existing/planned)
beam quality (existing/planned)
contrast ratio (existing/planned)
required service windows (daily, weekly, monthly, …)
Planned upgrades as part of the proposal:

Technical criteria: LASER (2)

LASER
Laser beam Quality and Stability: Assessing the stability and quality of the la beam, including pointing stability, beam profile, energy stability, and temporal acteristics, ensures consistent and reliable laser plasma acceleration performanc
pointing stability (existing/planned)
beam profile (existing/planned)
energy stability (existing/planned)
temporal characteristics (existing/planned)
Laser Synchronization: Examining synchronization capabilities with electron beam generation and acceleration processes ensures efficient operation and coor nation of laser plasma facilities, optimizing research productivity and outcomes.
laser oscillator on RF jitter (in case of external injection) - you don't need this f fully laser-driven FEL
laser on master oscillator jitter

Technical criteria: ELECTRON BEAM

ELECTRON BEAM
Beam Diagnostics and Control: Assessing capabilities for diagnosing and cont ling accelerated electron beams
Preferred Electron Injection Scheme
maximum energy
Rms Energy Spread
charge per bunch
Rms pulse length
Rms normalized emittance (h/v)
rep rate
electron diagnostics
removal of laser driver pulse

Technical criteria: FEL USER PARAMETERS

FEL User Parameters
number of lines
wavelength/photon energy
type of undulator
undulator parameters
Rho parameter
number of photons per pulse
pulse length
repetition rate
photon diagnostics
number of end-station
separation scheme X rays from residual laser pulse

Other criteria

- Geographic location, transportation, accomodation
- Local collaboration and expertise: partnerships, universities, industry
- Environmental impact and risk assessment
- Funding opportunities
- Compliance with legal and regulatory requirements
- Connection to defense and National Security (restrictions, separation)
- Recognition in national roadmap od RI’s
- Future expansion potential

How to use the bidbook template

- **The parameters should aim at achieving the CDR parameters for EuPRAXIA, including the precisions inside the ESFRI application** while some deviations are allowed (e.g. reflecting the already available technical equipment).
- staged realization possible, e.g. 1 GeV -> 5 GeV, 10-20Hz -> 100Hz and later 100
- **In this case the tables in this bid book should be provided for both cases with incremental costs, while the layout description should cover the full plan.**
- **The parameters should aim at achieving the CDR parameters for EuPRAXIA, including the precisions inside the ESFRI application,** while some deviations are allowed (e.g. reflecting the already available technical equipment). FEL is the paramount application and must be part of the proposal. The FEL will be judged on its science reach (e.g. FEL wavelength instead of electron beam energy).

proposed timeline for 2nd site selection

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- 27 Aug 2024, bid-book template discussion -> PANEL
- 10 Sep 2024, bid-book template finalization -> PANEL
- 25 Sep 2024, bid-book approval by CB
- 20 Dec 2024 bid-book submission (internal political/funding evaluation by bidders)
- Jan-Feb 2025, collegiate evaluation of bid-books-> PANEL
  - this phase could involve also requests of further clarification to the bidders,
- Feb 2025: Information meetings with STAB and the Sponsor's Board to evaluate if there are any objections to procedure or direction taken – as light as possible,
- Mar 2025 decision by dedicated CB on 2nd site proposal
- Apr 2025l submission of EU deliverable report: 2nd choice completed
- Apr 2025 Presentation to relevant bodies (ECFA, ICFA, ESFRI, TIARA, LEAPS, …). Collection of support letters 2nd site.

Discussion

(added for completeness)

D3.1 Report. “7 Summary of findings/Next steps”

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- Framework for 3RD country contributions (”in-kind”, financial)
- Strong **transverse needs** have been **identified,** e.g. start-to-end simulations.
- **Implementation engineering team** in each of the 2 sites:
  coordinate design and integration of material contributions from the non-hosting partners
- Potential **synergies between 1st** site (LNF) **and 2nd site should be explored** more deeply
- **identify one preferred international/European collaboration model**
  inspired form an existing **distributed ESFRI** project or landmark).
- Adopt a **collaborative model of one single** research infrastructure with two sites