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WP9 Status Report: an introduction

WP9 – RF, Magnets & Beamline Components

WP leaders: S. Antipov (DESY) & F. Nguyen (ENEA)

Elba Annual Meeting on September 24th, 2024



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101079773

- Compact magnets (both electromagnets and permanent magnets) for beam capture and transport
- Radiofrequency high power sources and structures for conventional acceleration
- Magnetic undulators for free-electron laser generation

High quality, high stability electron and photon beams in compact physical layout

- Primary objective: steer the technical progress on the development and design of accelerator components
 - Specify in detail Excellence Centers
 - Review potential prototype R&D
 - Coordinate funding requests
- Update concepts, parameters towards TDR

Undulators

- ENEA (Italy)
- ALBA (Spain)
- ELI (Czech Republic)
- INFN (Italy)
- UKRI (Great Britain)

Beamline magnets

- ALBA (Spain)
- CERN (Switzerland)
- ELI (Czech Republic)
- IASA (Greece)
- INFN (Italy)
- UKRI (Great Britain)

RF components

- CERN (Switzerland)
- CLPU (Spain)
- DESY (Germany)
- IASA (Greece)
- INFN (Italy)
- La Sapienza (Italy)

Core activity in 2024

- D9.1 Report on structures to be funded from national/bilateral/european level for RF, Magnets and beamlines components (M12)*
- D9.2 Report on technical results achieved in the field of RF, Magnets and beamlines components (M24)**
- M.20 Update of concepts for EuPRAXIA, systems status report (M24)**
- D9.3 TRL Report and maturity assessment on the development of RF, Magnets and beamlines components (M42)

* Done

** Final Version submitted to the management

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- Recent progress on permanent magnet quadrupoles suggests that **30% stronger magnets can be used for the capture triplet**, approaches are under development for **tuning** the quadrupole triplets **without changing the magnet positions** → variable aperture PMQ
- To allow laser propagation and maintain good quality normalized emittance, **it might be beneficial to use an active plasma lens** → more flexible a setup also in terms of energy tuning → see WP10
- Undulator technologies are driving the facility cost → **permanent magnet and superconducting undulators** identified as performant and sustainable

Today schedule:

Introduction – 5'

RF – 10' + 5'

Magnets – 10' + 5'

Undulators – 10' + 5'

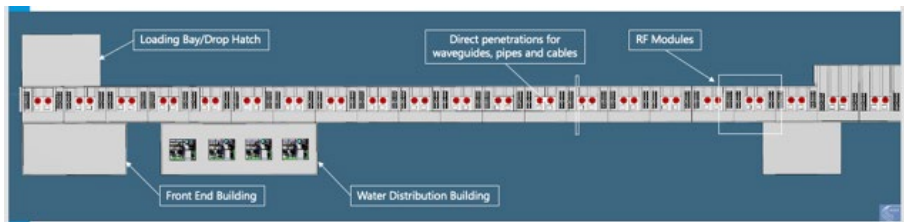
Institute of Accelerating Systems & Applications-IASA (GR)
National Technical University of Athens-NTUA (GR)



CAD and FEA schematic layout & simulations

IASA has a lot of experience in mechanical and electrical engineering, with part contributions to engineering design on CLIC, XLS-CompactLight, including:

- CAD conceptual 3D models for EuPRAXIA WP9 parts layout
- CAD conceptual 3D model for EuPRAXIA WP9 parts building areas
- FEA & simulations for EuPRAXIA WP9 parts design & operation



2024-09-20 N.GAZIS



- In a recent WP9 meeting, N. Gazis (IASA & ESS) offered CAD & FEA studies of the machine layout
- A. Molodozhentsev (ELI-ERIC) showed interests in the CAD design of the FEL photon beamlines → collaboration WP9-WP16 just started
- IASA is available to provide their CAD expertise to any interested site or institution
- In case, please contact:
Evangelos Gazis, egazis@central.ntua.gr
Nick Gazis, nick.gazis@ess.eu

EuPRAXIA_PP WP9 seventh meeting

Zoom link: <https://desy.zoom.us/j/95449458932?pwd=VDI2WGIwSHZXVEkvQndLWjRDeFVrdz09MeetingID:95449458932Passcode:6211>

14 June 2024 10:30

» Strutture INFN » Laboratori Nazionali di Frascati » Divisione Acceleratori » EUPRAXIA » EUPRAXIA PP

EuPRAXIA_PP WP9 sixth meeting

Zoom link: <https://desy.zoom.us/j/95449458932?pwd=VDI2WGIwSHZXVEkvQndLWjRDeFVrdz09MeetingID:95449458932Passcode:6211>

17 May 2024 10:30

» Strutture INFN » Laboratori Nazionali di Frascati » Divisione Acceleratori » EUPRAXIA » EUPRAXIA PP

EuPRAXIA_PP WP9 fifth meeting

Zoom link: <https://desy.zoom.us/j/95449458932?pwd=VDI2WGIwSHZXVEkvQndLWjRDeFVrdz09MeetingID:95449458932Passcode:6211>

18 April 2024 14:30

» Strutture INFN » Laboratori Nazionali di Frascati » Divisione Acceleratori » EUPRAXIA » EUPRAXIA PP

Introductory meeting WP9

Link: [https://infn-it.zoom.us/j/98567023672?pwd=Q3hnQ2R6T01ZdG91dnB0QnVyYzlmQT09IDriunione:98567023672Codice d'accesso:440133](https://infn-it.zoom.us/j/98567023672?pwd=Q3hnQ2R6T01ZdG91dnB0QnVyYzlmQT09IDriunione:98567023672Codice%20d'accesso:440133)

09 April 2024 10:45

» Strutture INFN » Laboratori Nazionali di Frascati » Divisione Acceleratori » EUPRAXIA » EUPRAXIA PP

EuPRAXIA_PP WP9 fourth meeting

Zoom link to the meeting Zoom ID: 954 4945 8932; Passcode: 6211

25 March 2024 09:30

» Strutture INFN » Laboratori Nazionali di Frascati » Divisione Acceleratori » EUPRAXIA » EUPRAXIA PP

EuPRAXIA_PP WP9 third meeting

Zoom Link to the meeting

11 July 2023 15:00

» Strutture INFN » Laboratori Nazionali di Frascati » Divisione Acceleratori » EUPRAXIA » EUPRAXIA PP



Thank you to the whole WP9 crew for contributions, attendance & motivations

Thursday 18 Apr 2024, 14:30 → 15:30 Europe/Rome

Description Zoom link: <https://desy.zoom.us/j/95449458932?pwd=VDI2WGIwSHZXVEkvQndLWjRDeFVrdz09>

14:35 → 14:55 RF system choices for the EuPRAXIA 1st site

Speakers: Enrica Chiadroni (Università La Sapienza), Luigi Fallace (Istituto Nazionale di Fisica Nucleare)



14:55 → 15:05 Laser-to-RF synchronization

Speaker: Throsten Lamb (DESY)



Friday 17 May 2024, 10:30 → 12:00 Europe/Rome

Description Zoom link: <https://desy.zoom.us/j/95449458932?pwd=VDI2WGIwSHZXVEkvQndLWjRDeFVrdz09>

10:30 → 10:50 Undulator options for EuPRAXIA: 1st site choices

Speaker: Federico Nguyen (ENEA)



10:50 → 11:05 Magnet design for EuPRAXIA@SPARC_LAB

Speaker: Lucia Sabbatini (Istituto Nazionale di Fisica Nucleare)



Coordinator




INFN
Istituto Nazionale di Fisica Nucleare



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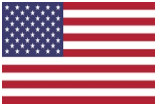


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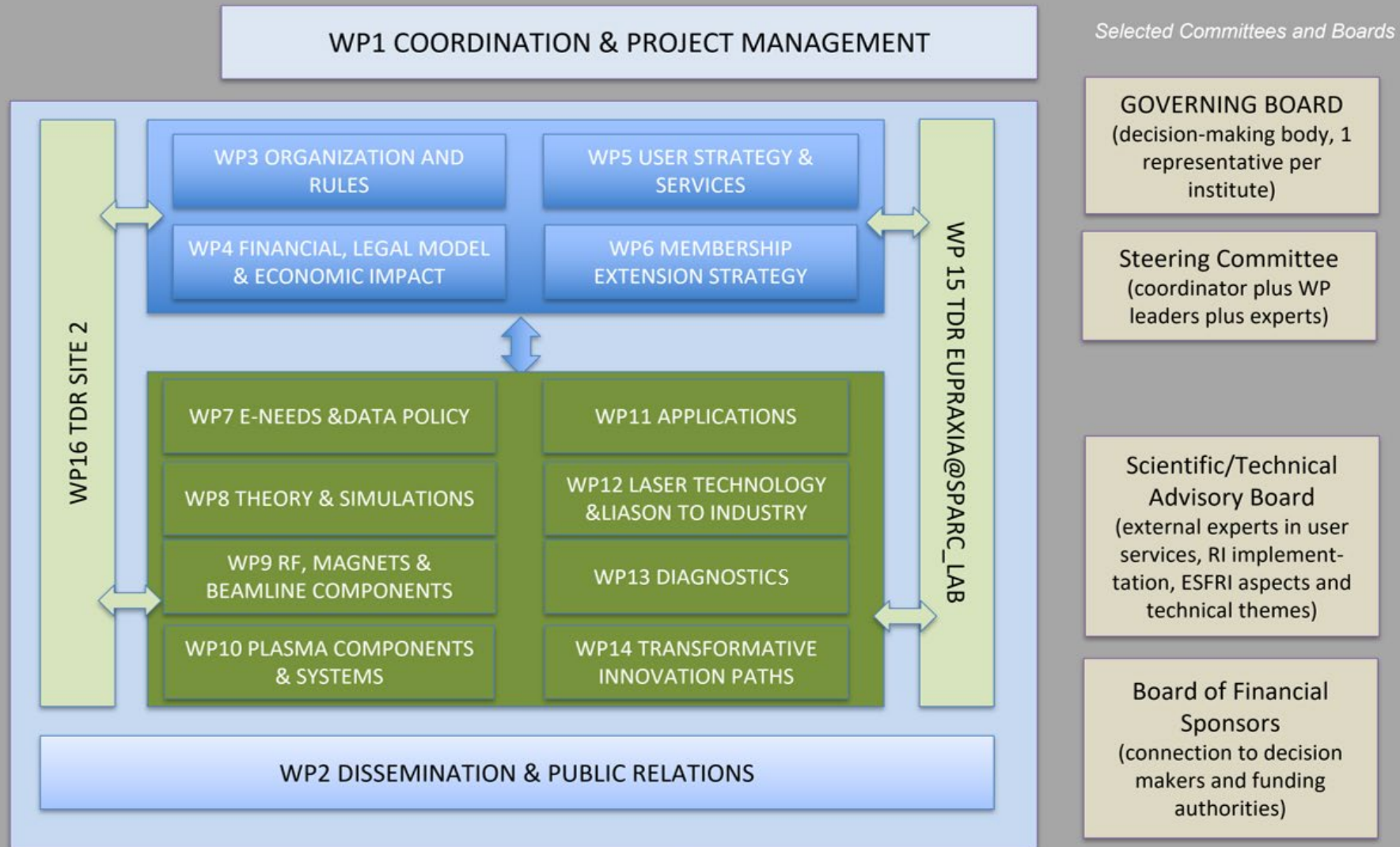
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- EuPRAXIA Preparatory Phase



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- EuPRAXIA Doctoral Network



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- EuAPS



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