WP3 – Access to Research Infrastructures for Accelerator R&D

Kick Off Meeting EURO-LABS

3–5 Oct 2022
Bologna
Europe/Rome timezone

I. Efthymiopoulos – for the WP3

This project has received funding from the European Union's Horizon Europe Research and Innovation programme under Grant Agreement No 101057511.

EC-funded TA in Accelerator RIs

A long-history of TA programs embedded in various projects before EURO-LABS

2 RI
WP5 – HiRadMat@SPS
WP6 – MICE@STFC

3 RI
WP8 – ICTF@STFC
WP9 – HiRadMat@SPS, MagNet@CERN

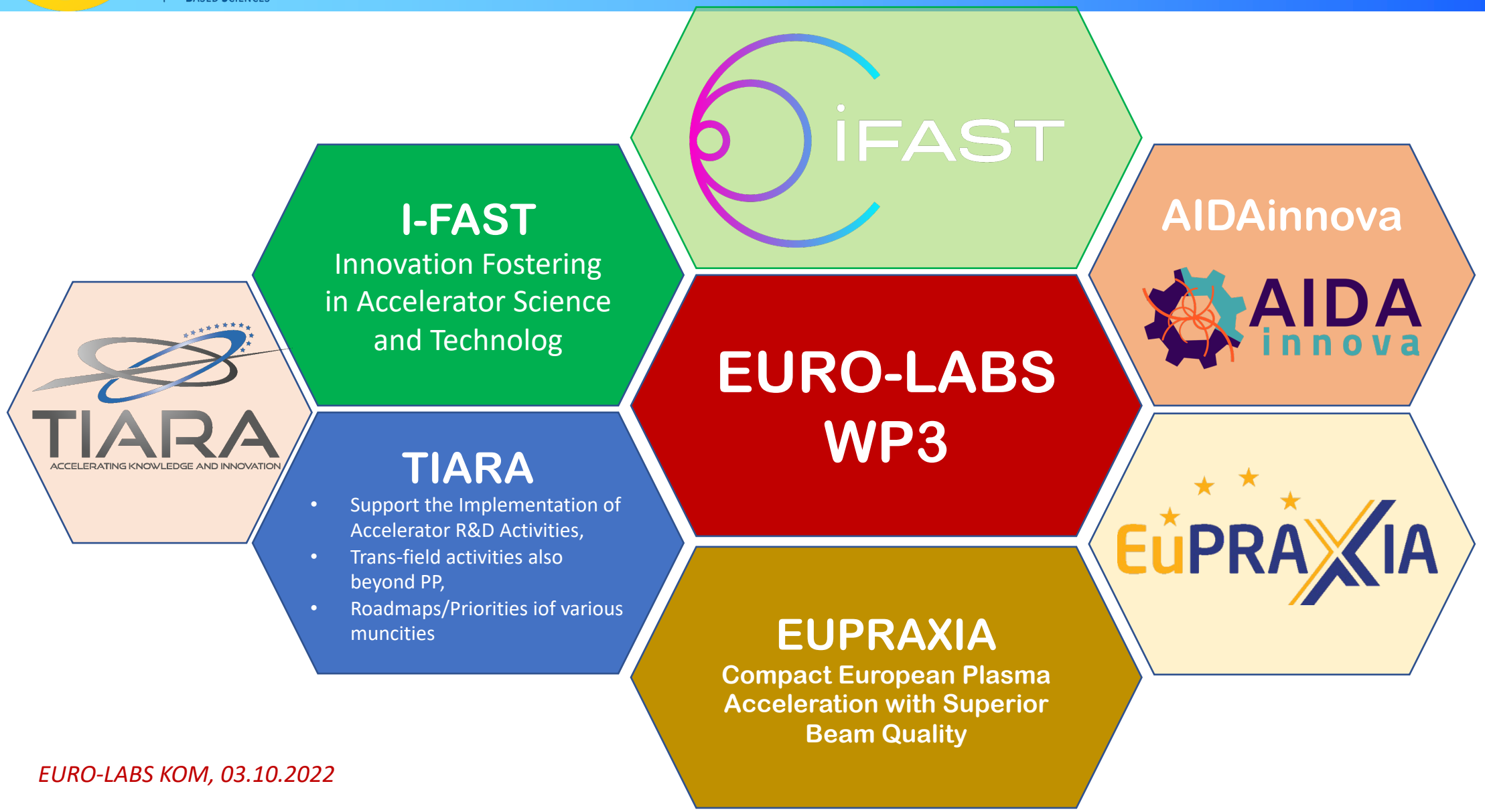
13 RI
WP9 – Magnet testing
WP10 – Material testing
WP11 – Electron & Proton beam testing
WP12- Radio Frequency testing
WP13-13 Plasma beam testing

Project	TNA Budget *[Meuros]*	%/total
EUCARD	0.282	2
EUCARD2	0.450	5.6
ARIES	2.000	20
EURO-LABS $_{\text{accel RIs}}$	**3.270**	**23**

WP3 - Goals

- **Extend** participation and include the **leading facilities** involved in **Accelerator R&D** in Europe
- **Maintain** and further **strengthen** the collaboration, exchange of information, and knowledge between the **facilities** and the **User Community**
- **Support** the User Groups in their Research – provide expert help **exploit the full capabilities** and extract the maximum scientific outcome from the facilities
- With targeted **service improvements**, enrich the possibilities of the facilities to the profit of the Users
- Fertilize **synergies** between the research communities and **applications**
- Support ongoing **R&D efforts** in the **Present** and **Future Accelerators**
- Targeted **Outreach & Training** activities to attract **new** (or to be) **Researchers** in the Field of **Accelerators**

WP3 & Accelerator R&D



WP3 - Accelerator RIs

WP3
Access to RI for Accelerators

WP Coordinator: **I. Efthymiopoulos**

Task 1 N. Charitonidis - CERN	Task 2 Sylvie Leray - CEA	Task 3 Anthony Gleeson - UKRI	Task 4 Urszula Gryczka - INTC
Material Testing Facilities	Technology Infrastructures	Electron Beam Facilities	Applications
HiRadMat@SPS(*)	FREIA(*) *(Univ. Uppsala)*	KIT-ALFA (ANKA+FLUTE)(*)	INTC –RAPID *(Warsaw)*
	INFN –LASA (*) *(Milano)*	VELA/CLARA *(Univ. Daresbury)*	CLEAR CERN
	INFN-THOR(*) *(Univ Salerno)*	INFN – BTF Frascati	
	IJCLAB SUPRATECH	INFN – SPARC Frascati	
	CEA Irfu-Synergium(*)	CEA LiDyl LPA-UH100(*)	
	XBOX CERN		

- (*) budget for service improvements assigned
- new in TA program

WP3.1 – Material Testing Facilities

	Facility	Location	Coordinator	Description	Expected Users
	Tast 1 : Material Testing Facilities				
1	**HiRadMat**	CERN	Nikos Charitonidis	Intense pulsed beam from CERN SPS, 2.4MJ/pulse	LHC collimators, Crystal collimators, RADIATE collaboration for beam intercepting equipment, Beam Instrumentation, HEP detectors **Recent highlight:** Experiment to study filamentation of particle beams in plasma interaction – FIRST use of accelerator facilities for astrophysics experiments!

WP3.1 – Material Testing Facilities

- HiRadMat@CERN
  - High-intensity pulsed beam from CERN SPS proton and ions beams
  - R&D on material testing at beam impact – near beam devices (collimators)- beam windows, …

Other facilities for material testing R&D in WP2, as well as irradiation facilities in both WP2 and WP4

WP3.2 – Technology Infrastructures

	Facility	Location	Coordinator	Description	Expected Users
	Task 2 : Technology Infrastructures				
1	**FREIA/Univ. Uppsala**	Uppsala, Sweden	Akira Miyazaki	Test stand for SC magnets and RF, vertical (GERSEMI) and horizontal (HNOSS) cryostat	ESS, CERN, MYRRHA/MINERVA, ITER/DONES, and PIP II at Fermilab, US)
2	**INFN-LASA**	Milano Italy	Dario Giove	Test stand for SC magnets and RF cavities, complex UHV system for growing photocathodes, laser applications for cavities	LAL Orsay, Saclay
3	**INFN-THOR**	Salerno, Italy	Umberto Gambardella	Horizontal test stand for SC magnets	GSI
4	**IJCLab SUPRATECH**	CNRS Orsay, France	Walid Kaabi	Test stand for SC RF cavities	US teams from PIP-II
5	**LRFU-Synergium**	CEA Saclay, France	Sylvie Leray, Pierre Vedrine	Characterization of thin film SC layers for RF cavities and materials at low temperature	Teams from CERN, FermiLab, Jlab, Chicago Univ. possibly industrial firms
6	**XBOX**	CERN	Roberto Corsini	Hgh-power RF testing	

WP3.2 – Technology Infrastructures

FREIA @ UU
Hnoss – Gersemi – Cryo Test Stand
facility for testing RF cavities and SC magnets,
V & H cryostats

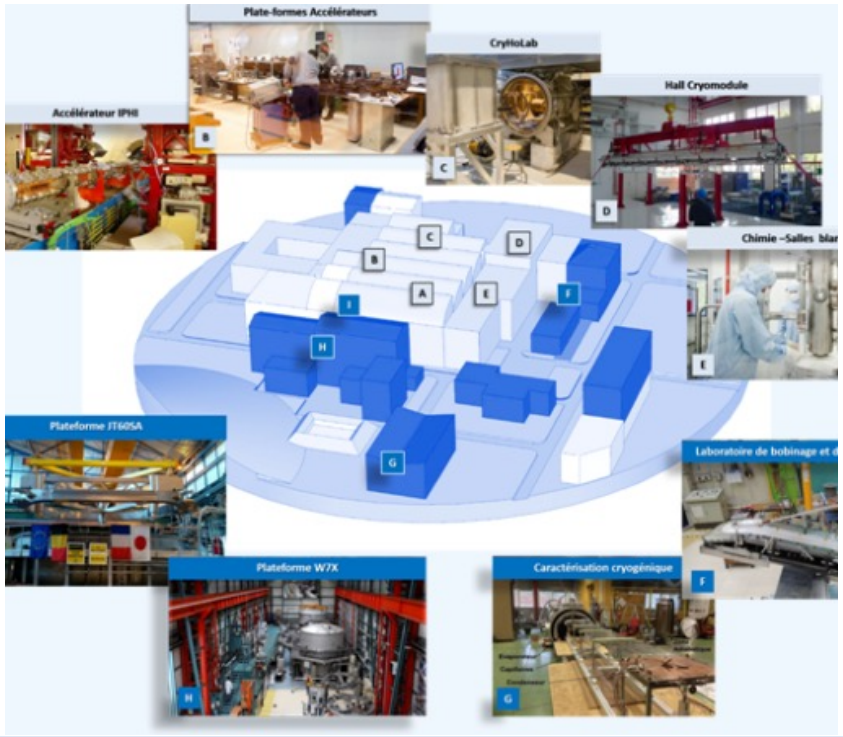
LASA @ INFN-MI
facility for testing RF cavities and SC magnets
V cryostats

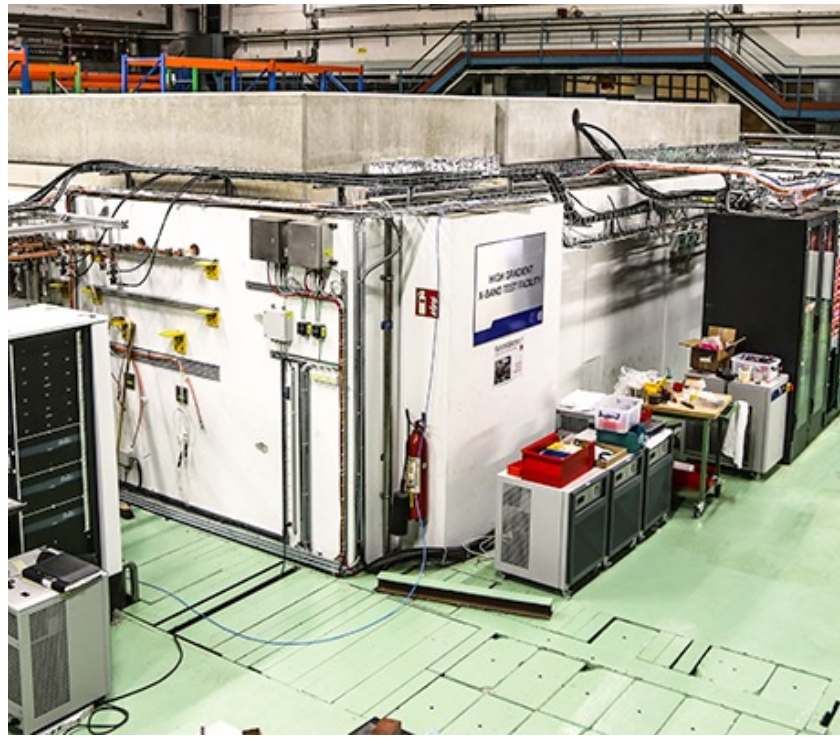
THOR & INFN – USalerno
facility for testing SC magnets
H cryostat

WP3.2 – Technology Infrastructures

IJCLab SUPRATECH @ CNRS Orsay
facility for testing RF cavities, cryomodules, V & H cryostats

LRFU-Synergium @ CEA-Saclay
DACM facility for characterization of materials used in SRF, material samples at low temperature, mechanical test lab





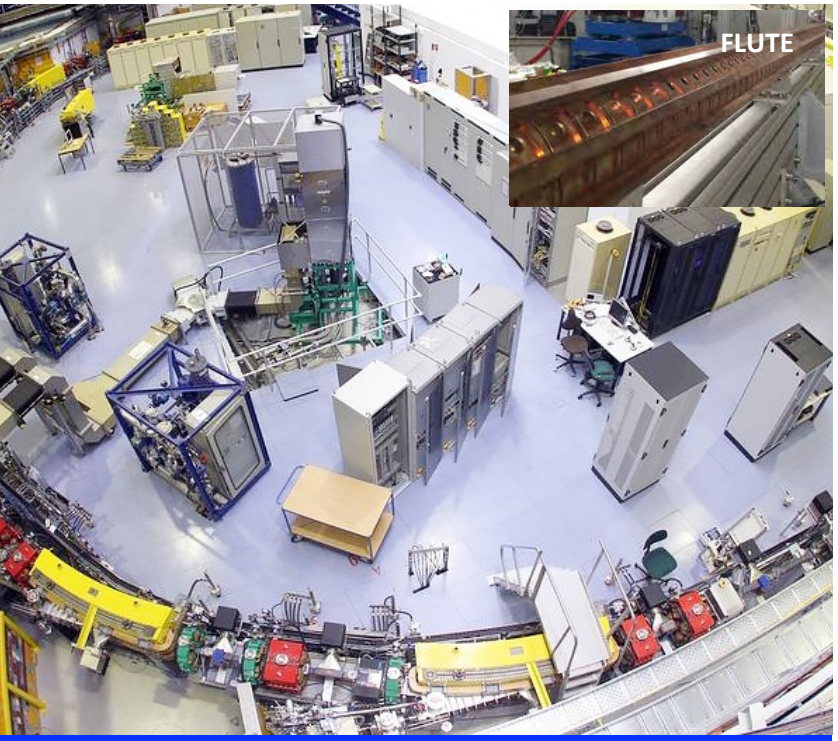
XBOX @ CERN
Klystron X-band test stands (11.994GHz – 50MW/1.5µs/50Hz and 6MW/5µs/400Hz) klystrons

WP3.3 – Electron Beams

	Facility		Location	Coordinator	Description	Comments, Expected Users
	Tast 3 : Electron and plasma Beams					
1	**KIT-ALFA**	- ANKA -FLUTE	Karlsruhe, Germany	Robert Ruprecht	- Intense electron beam 0.5-2.5GeV - Photo-injector with laser,7-40/50 MeV electrons	- THz radiation experiments
2	**STFC**	CLARA	Daresbury, UK	Anthony Gleeson	Versatile electron accelerator, up to 40MeV	
3	**INFN-LNF**	BTF	Frascati, Italy	Alessandro Gallo	Electron beam from linac, 25-500 MeV	Intensity down to single electron!
		SPARC			10-500pC e-bunches, 20fs-5ps rms, 80-140 MeV	FEL community, material THZ radiation, plasma electron studies
4	**LiDyl**	LPA-UH100	CEA, Saclay, France	Sandrine Dobosz	Laser-plasma accelerator, UHI 100 (electron source), 100TW class laser	New improved facility to operate in spring 2022

WP3 – RI for Accelerators

Electron Beams

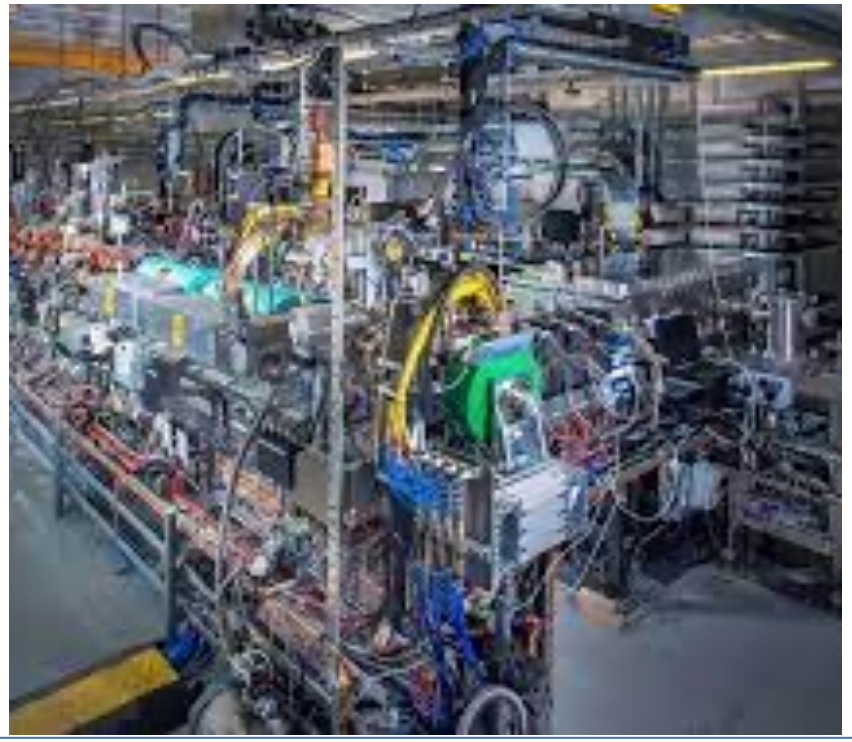


ANKA-FLUTE @ KIT-ALFA

Test facility with electron and photon beams (0.5-2.5 GeV) variable bunch lengths (50ps to few ps) – test facility with THz radiation

CLARA @ UKRI-Daresbury

Facility offering electron beam (up to 40MeV/c) and variable bunch length, down to 0.3ps$_{upgrade}$



BTF2 - SPARC @ INFN-LNF

Pulsed high-intensity electron/positron beam (up to 500/700 MeV, 10^6e/s) for BTF – short electron pulses 10-500pC e-bunches, 20fs-5ps rms, 80-140 MeV for SPARC

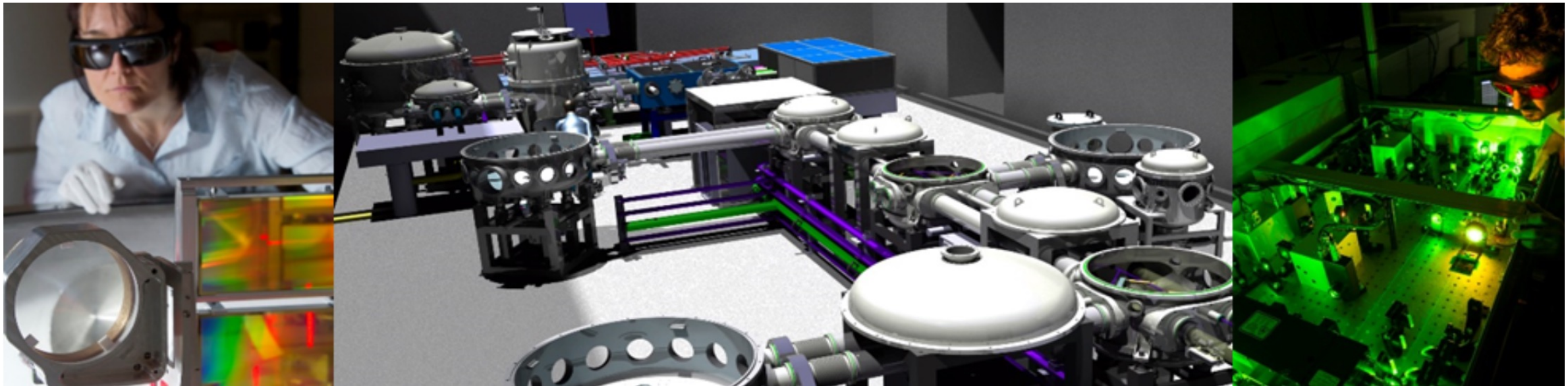
WP3 – RI for Accelerators

Electron Beams

LPA-UHI100 @ CEA-Saclay

Laser-plasma accelerator, UHI 100 (electron source), 100TW class laser to produce a 25fs pulse, electron beam up to 150 MeV, 50 pC/shot or 10 MeV over 100µm, 10nC/shot – Attosecond source for beam diagnostics R&D

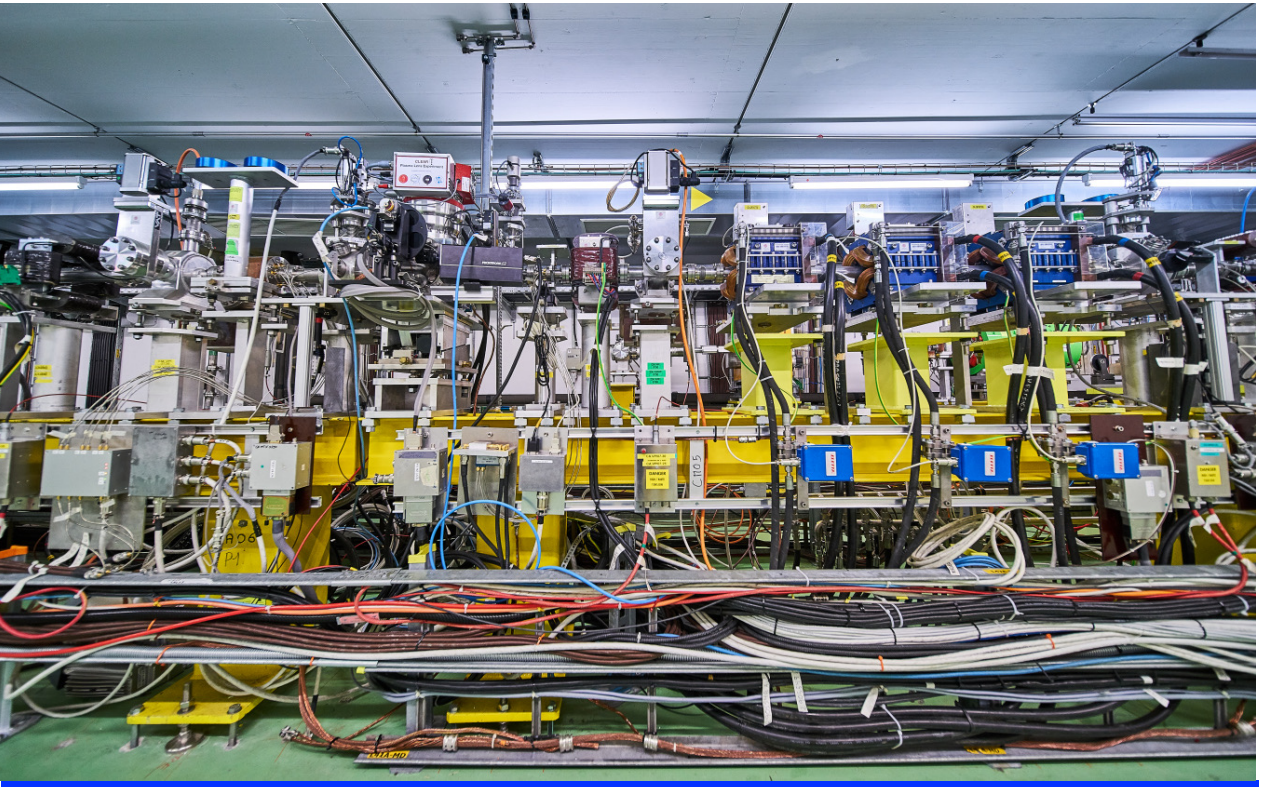
*Service improvement plan by introducing **Machine Learning** techniques for beam control*



WP3.4 – Applications

	Facility		Location	Coordinator	Description	Comments, Expected Users
	Task 4 : Applications					
1	**CLEAR**		CERN	Roberto Corsini	Electron beam, 200 MeV electrons, 10Gy/s dose	VHEE/FLASH, CERN-CHUV collaboration,
2	**INCT**	RAPID	Warsaw, Poland	Urszula Gryczka, Andrej Schmiewski	Electron beams 0.1-10MeV, 0.1-20kW – 5 electron accelerators, 3 Gamma sources (Co60)	Radiation chemistry, ns-pulse radioliysis

WP3.4 – Applications



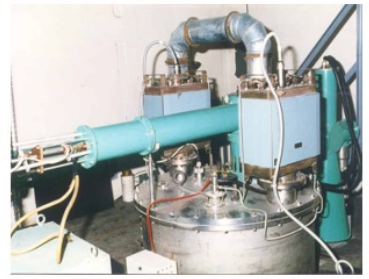
CLEAR @ CERN

Test facility with electron and beams (60-230 MeV, 0.1-10ps rms, up to 30nC/pulse) – beam diagnostics R&D – medical applications VHEE beams/FLASH

RAPID @ INCT

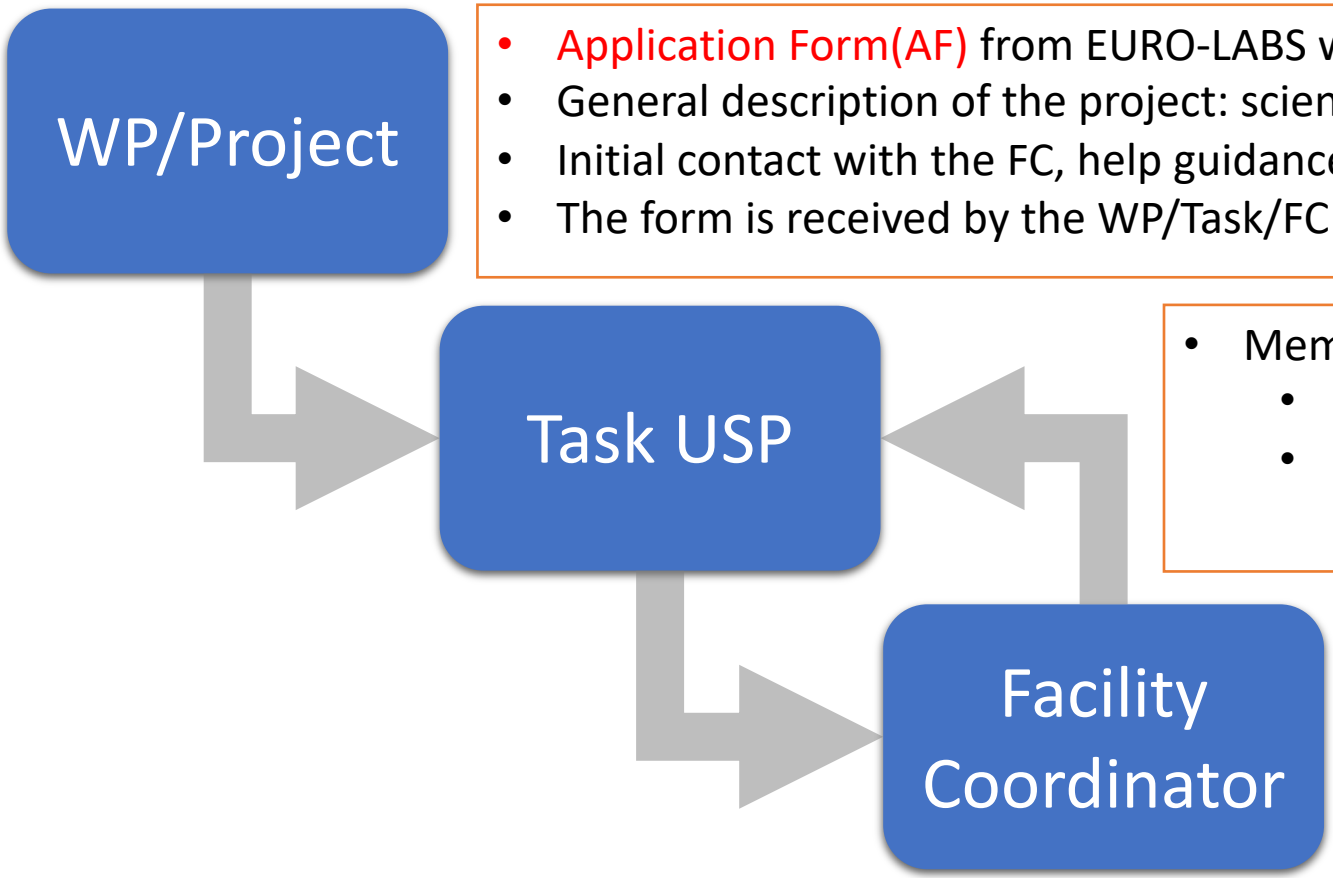
Facility providing electron beams (0.2-10MeV, 0.1-20kW) and gamma irradiations (Co60) – 10MeV ns e-pulse for Radiolysis

Pilot plant facility
ILU 6
0.2-2 MeV, 20 kW
INCT, Poland



Handling of TA Requests

- USP at the Task Level ⇌ Facility User Selection$_{\text{Beam-time Allocation}}$ Panel



- Application Form(AF) from EURO-LABS web page
- General description of the project: scientific interest, targeted Facility, user team, dates
- Initial contact with the FC, help guidance to fill the form
- The form is received by the WP/Task/FC via e-mail

- Members: FC of the task (TL as chair), external experts (50%)
  - Review, verify validity of the proposed Facility
  - Exchange with the FC

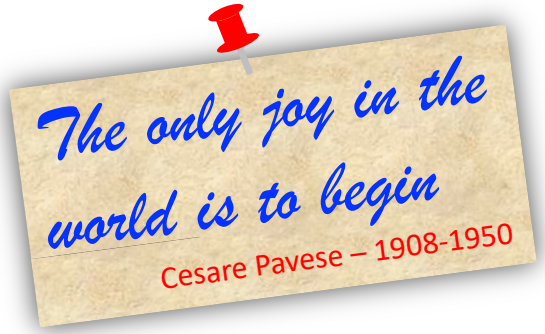
- Complete AF with other documents required by the facility (safety, acess, ...)
- Accept request, schedule, allocate funds
- Execute the Access, maintain User information

Beyond TA : WP3 ⇌ WP5

- **Dissemination**
  - Articles in NewsLetters and Journals (CERN Bulletin, CERN Courrier, Accelerating News, …)
  - Presentations in other project meetings (I-FAST, TIARA)
  - Advertise experiments and results from the Facilities in Conferences, Periodicals

- **Training - Outreach**
  - **Accelerators for Universities and Researchers** : a yearly program, where teams from Universities are invited to participate, solve some problems and/or propose an experiment with the winning teams invited for a hands-on experience in the Facilities
    - Target Universities and Technical schools from countries outside the usual domain of HEP(Nuclear) Physics
  - Sponsor seminars and conference presentations from Young Researchers who received EURO-LABS funding to present their results


EURO-LABS
EUROPEAN LABORATORIES
FOR ACCELERATOR
BASED SCIENCES


The only joy in the world is to begin
Cesare Pavese – 1908-1950