



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under GA No 101004730.

WP6: Novel Particle Accelerators Concepts and Technologies

Steering Meeting, 16 November 2021, Zoom

Ralph Assmann, DESY & LNF/INFN

Massimo Ferrario, LNF/INFN

iFAST



Tasks of WP6 – Novel Particle Accelerators Concepts and Technologies

- Task 1 (RA + M. Ferrario): **Novel Particle Accelerators Concepts and Technologies** (NPACT – EuroNNAc4) M1 – M48
Sub-task leaders: B. Holzer (CERN), P. Nghie (CEA), A. Specka (CNRS), R. Walczak (Oxford)
- Task 2 (Leo Gizzi): **Lasers for Plasma Acceleration** (LASPLA) M1 – M48
- Task 3 (Cedric Thauray): **Multi-scale Innovative targets for laser-plasma accelerators** (MILPAT) M1 – M32
- Task 4 (Francois Mathieu): **Laser focal Spot Stabilization Systems** (L3S) M1 – M36

WP6 Deliverables

Deliverables related to WP6	
D6.1: EAAC workshops and strategies. <i>Report on the EAAC workshops as strategic forums for international accelerator R&D and resulting strategies</i>	M42
D6.2: LASPLA Strategy. <i>Report on a strategy for laser drivers for plasma accelerators.</i>	M46
D6.2: Electron acceleration experiments with new targets. <i>Report on electron acceleration with micro-scale target at a kHz repetition rate, and with long targets at the multi-Joule level.</i>	M24
D6.4: Improvement of the laser intensity stability on target. <i>Report showing the stability on two laser facilities before and after improvement.</i>	M36

EAAC Workshop

2021

Hybrid

European

Advanced Accelerator

Concepts

Workshop

5th Edition



5th European Advanced Accelerator Concepts Workshop

20–23 Sep 2021
INFN LNF
Europe/Rome timezone

Enter your search term



Overview

Committees

Timetable

Scientific Program - Indico
Style

My Conference

My Contributions

5th EAAC - Group photo

Participant List

INFN Privacy Policy

WIFI Internet Access

How to get LNF and
general info

Previous Editions

Support

✉ eaac2021@lists.lnf.infn.it

5th European Advanced Accelerator Concepts Workshop

REGISTRATION IS CLOSED

The workshop will take place at LNF-INFN from the 20th to the 22nd of September 2021 in a hybrid format, followed by a EuroNNAC meeting on the 23rd of September.

Under present rules most of the workshop will take place in a virtual and reduced format, allowing an expectation of maximum of **40 people** to attend in-person at the LNF-INFN, in Frascati (Rome, Italy).

For those participants who will be notified as "in presence", it will be requested to show EU covid-19 green pass or covid-19 certificate at the entrance of the LNF area and/or Bruno Touschek Auditorium due to the new Italian law issued on July 22, 2021. Here some useful information about travelling to Italy: [link](#).

LNF-INFN decline all responsibility for any quarantines/isolations that may occur in the event of a positive COVID-19 case during the meeting.

The focus this year will be on 18 plenary talks and a one day event on the accelerator R&D roadmap discussions ongoing in Europe and the US.

The poster session and the usual parallel sessions of working groups cannot take place.

The **European Advanced Accelerator Concepts Workshop (EAAC2021)** has the mission to discuss and foster methods of beam acceleration with gradients beyond state of the art in operational

EAAC Workshop

2021

Hybrid

European

Advanced Accelerator

Concepts

Workshop

5th Edition



5th European Advanced Accelerator Concepts Workshop 20 Sep - 23 Sep

Created by Maria Rita Ferrazza (maria.rita.ferrazza@infn.it) from event on 15 Sep 2019

Registration

Stats for "5th EAAC21 Pre-registration form"

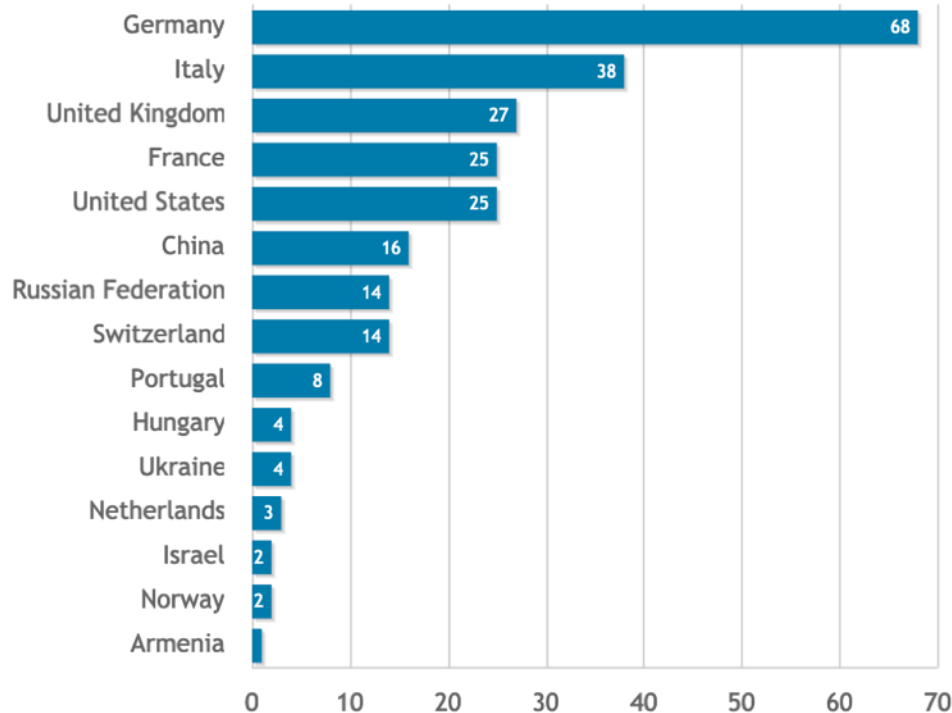
Overview

256
Registrations

0
Days left
to register

20
Countries

Registrants per country



EAAC Workshop

2021

Hybrid

European

Advanced Accelerator

Concepts

Workshop

5th Edition



R. Assmann & M. Ferrario – WP6 – I.FAST Steering Meeting Nov. 2021

EAAC Workshop

2021

Hybrid

European

Advanced Accelerator

Concepts

Workshop

5th Edition



EAAC Workshop

2021

Hybrid

European

Advanced Accelerator

Concepts

Workshop

5th Edition



Thanks to Laura Corner and the PC

EAAC Scientific Session Talks:
5 in presence out of 20

EAAC Special Expert Panel Sessions Talks:
3 in presence out of 7

Laura Corner, (University of Liverpool, United Kingdom), *chair*

Ralph Assmann, (DESY, Germany and INFN-LNF, Italy)

Massimo Ferrario, (INFN-LNF, Italy)

Bernhard Holzer, (CERN, Switzerland)

Phi Nghiem, (CEA, France)

Arnd Specka, (Ecole Polytechnique, France)

Roman Walczak, (JAI, United Kingdom)

EAAC Workshop

2021

European

Advanced Accelerator

Concepts

Workshop

5th Edition



Shanghai Institute of Optics and Fine Mechanics, CAS

High-quality electron beams and free electron lasing based on a laser wakefield accelerator at SIOM

Ke Feng, Wentao Wang, and Runxin Li

State Key Laboratory of High Field Laser Physics,
Shanghai Institute of Optics and Fine Mechanics (SIOM),
Chinese Academy of Sciences (CAS)

5th EAAC Workshop, 20-23 Sep, 2021



W. T. Wang, K. Feng, *et al.*,
Nature, **595**, 561 (2021).

EAAC Workshop

2021

European

Advanced Accelerator

Concepts

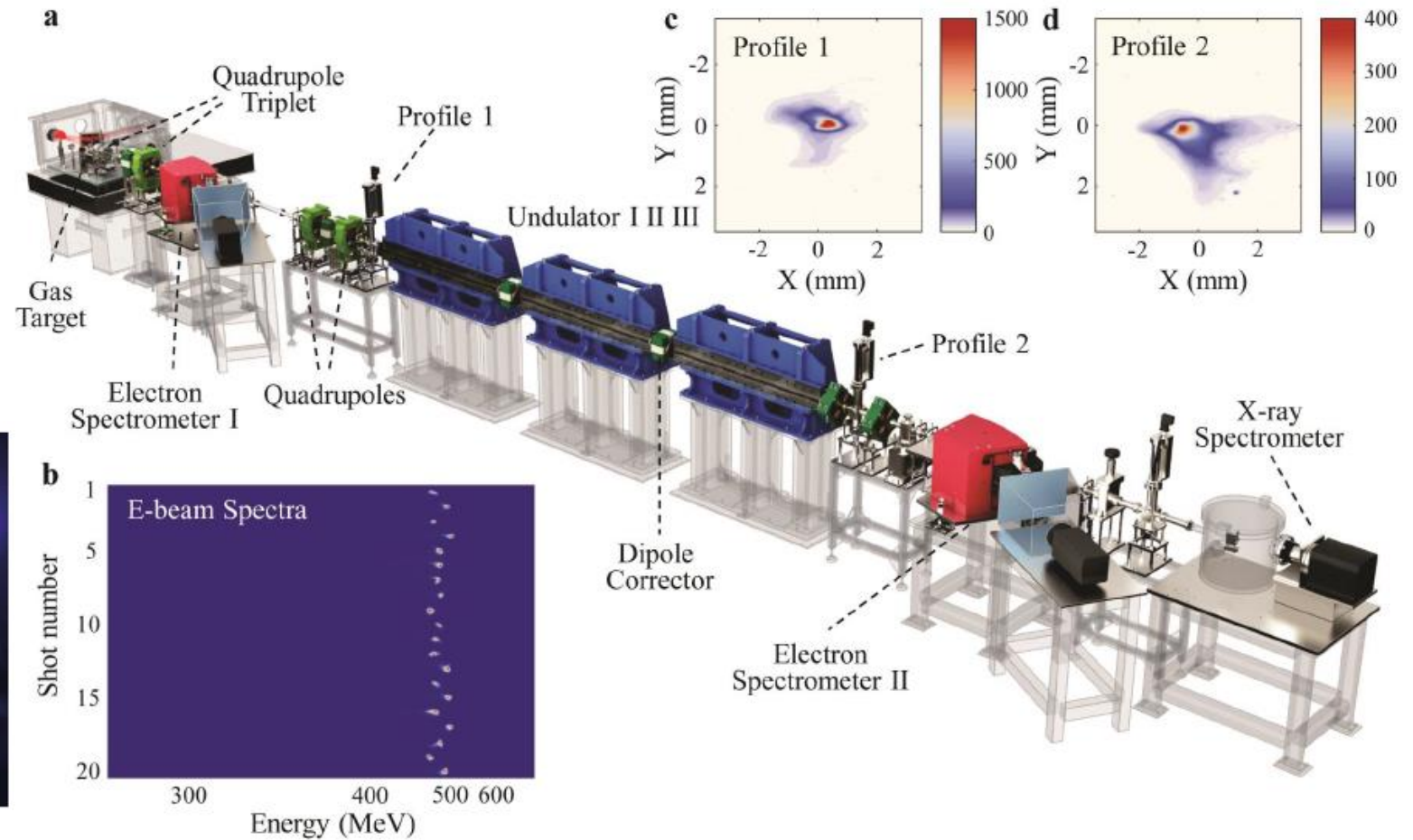
Workshop

5th Edition



W. T. Wang, K. Feng, *et al.*,
Nature, **595**, 561 (2021).

Table-top free electron laser: schematic layout



Device schematic of table-top free electron laser based on LWFA.



EAAC Workshop

2021

European

Advanced Accelerator

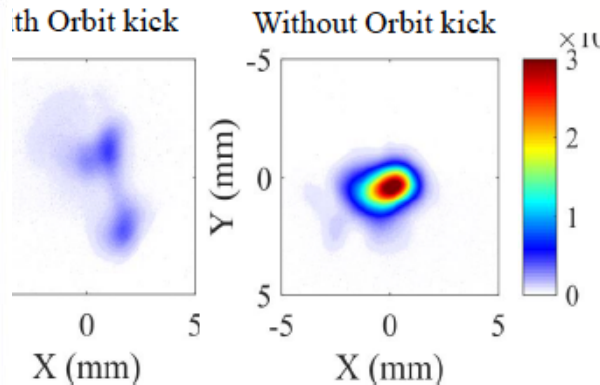
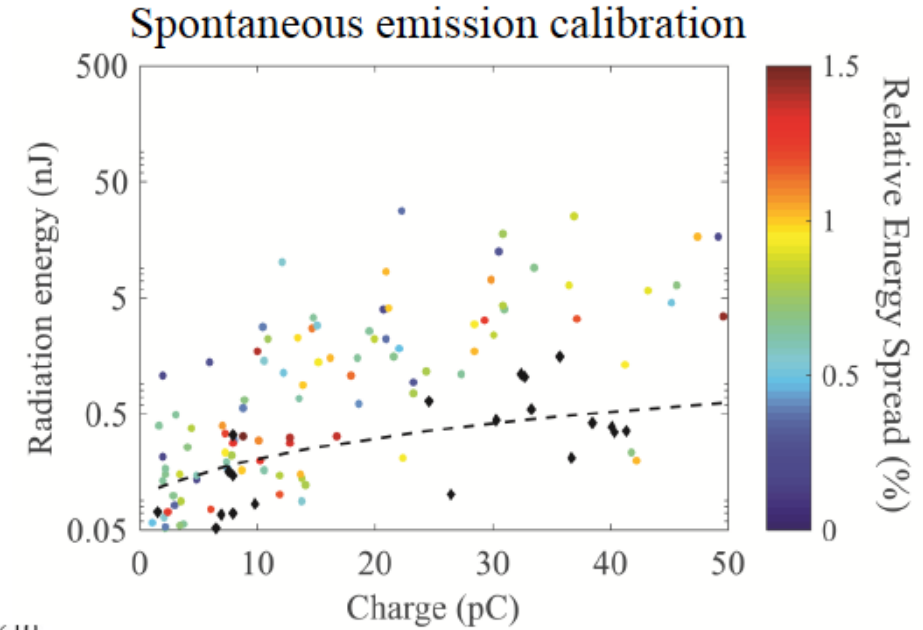
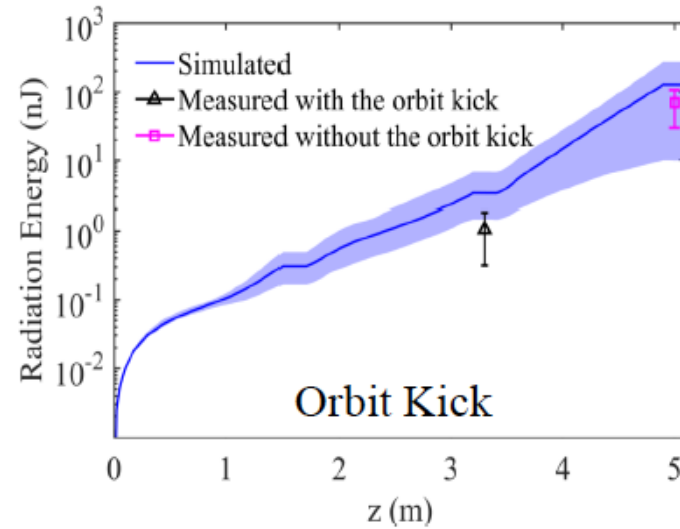
Concepts

Workshop

5th Edition



Table-top free electron laser: exponential gain



Demonstration of exponential gain:

- **Orbit kick method:** The gain process was spoiled by kicking the e beam at the entrance of the third undulator; The maximum power gain in the third undulator approximates 100-fold.
- **Spontaneous emission calibration:** The spontaneous emission curve was fitted by spoiling the energy spread of the e beam.

EAAC Workshop

2021

European

Advanced Accelerator

Concepts

Workshop

5th Edition



5th European Advanced Accelerator Concepts Workshop

20-23 September 2021, INFN LNF, Frascati

First lasing of a FEL in SASE and seeded regimes with a compact beam-driven plasma accelerator

R. Pompili (LNF-INFN)
riccardo.pompili@lnf.infn.it

On behalf of the SPARC_LAB collaboration



EAAC Workshop

2021

European

Advanced Accelerator

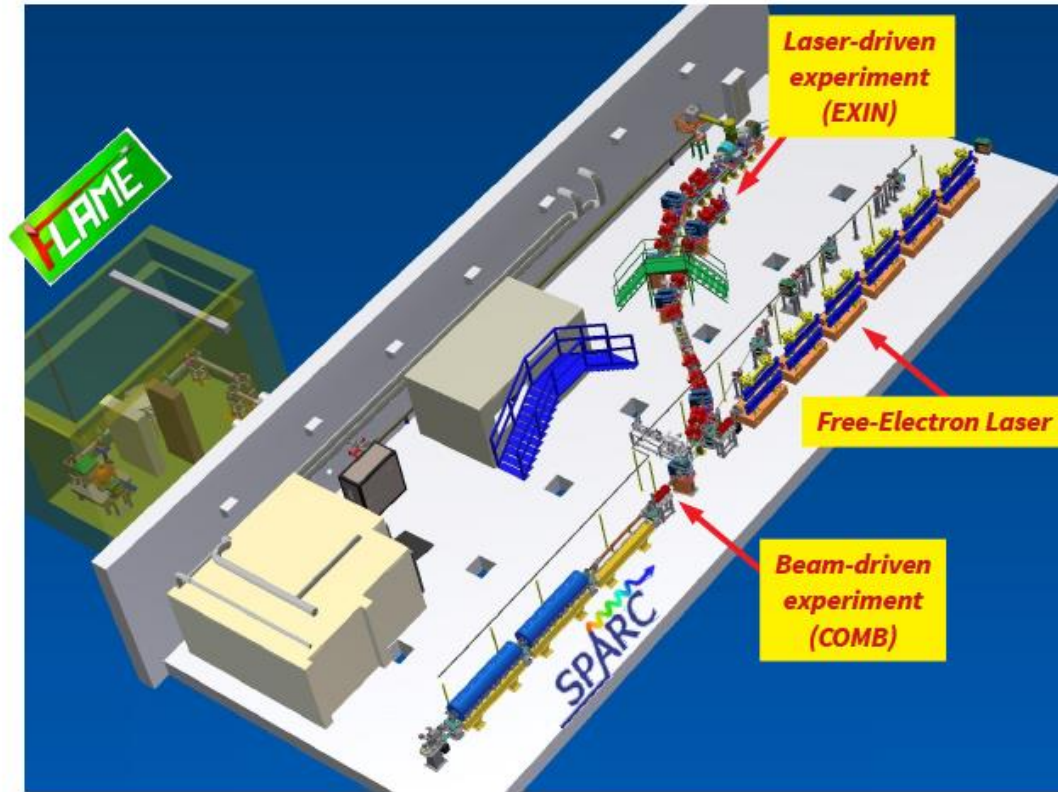
Concepts

Workshop

5th Edition



SPARC_LAB facility



Ferrario, M., et al. "SPARC_LAB present and future." NIMB 309 (2013): 183-188.



EAAC Workshop

2021

European

Advanced Accelerator

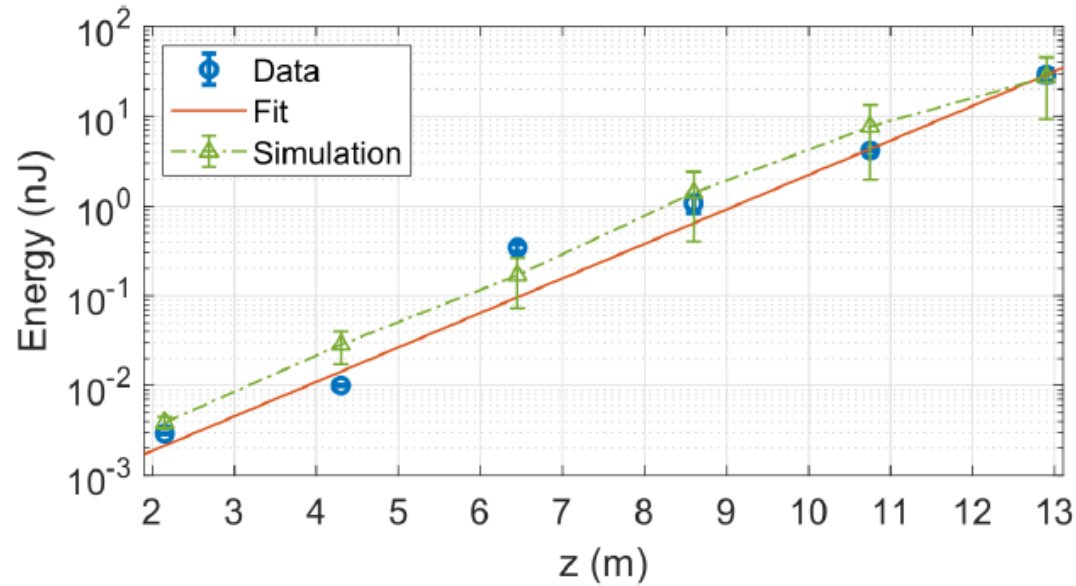
Concepts

Workshop

5th Edition



FEL driven by PWFA: exponential gain

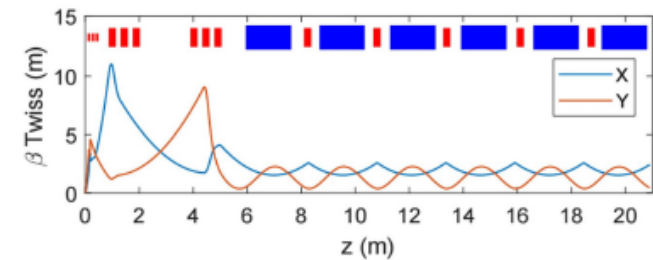


R. Pompili, et al.
submitted

Exponential gain of FEL radiation energy

Data taken with 6 (Si) photo-diodes downstream

the undulators



EAAC Workshop
2021
European
Advanced Accelerator
Concepts
Workshop
5th Edition

Stable acceleration of proton beams to energies beyond 80 MeV at rep-rated laser systems

Tim Ziegler^{1,2},

C. Bernert^{1,2}, S. Bock¹, F.-E. Brack^{1,2}, T. E. Cowan^{1,2}, N. P. Dover^{3,4},
M. Garten^{1,2}, L. Gaus^{1,2}, I. Goethel^{1,2}, H. Kiriya³, T. Kluge¹, S. Kraft¹, F. Kroll¹,
J. Metzkes-Ng¹, M. Nishiuchi³, T. Püschel¹, M. Rehwald^{1,2}, H.-P. Schlenvoigt¹,
U. Schramm^{1,2} & K. Zeil¹

1) *Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany*

2) *Technische Universität Dresden, Germany*

3) *Kansai Photon Science Institute, National Institutes for Quantum and Radiological Science & Technology, Kyoto, Japan*

4) *John Adams Institute for Accelerator Science, Imperial College London, London, United Kingdom*

5th European Advanced Accelerator Concepts Workshop

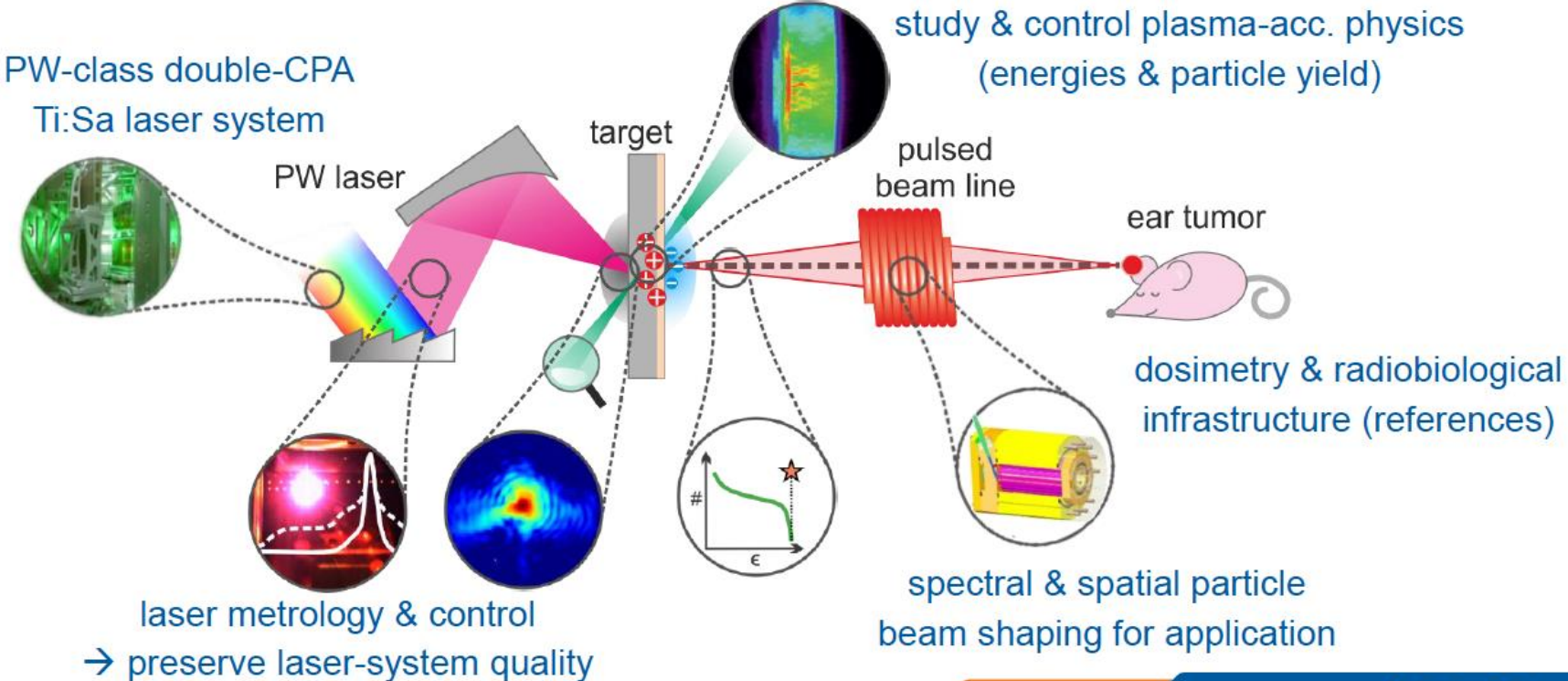


5th EAAC Workshop

Tim Ziegler | t.ziegler@hzdr.de | www.hzdr.de

hzdr

Laser-driven proton sources for high-dose rate radiobiology



EAAC Workshop

2021

European

Advanced Accelerator

Concepts

Workshop

5th Edition

And many other impressive results...

See EAAC'21 website and talks posted:

<https://agenda.infn.it/event/24374/timetable/?view=standard>

Strategy

- EuPRAXIA
- Plasma accelerators for particle physics

EuPRAXIA – Project Spin-off from EAAC and EuroNNAc

The European Plasma Accelerator Facility – Press Release ESFRI

ESFRI

ABOUT ESFRI ROADMAP EVENTS NEWS WORLD OF RIS LIB

HOME > NEWS > LATEST ESFRI NEWS

ESFRI announces new RIs for Roadmap 2021

30.06.2021
PRESS RELEASE

ESFRI announces the 11 new Research Infrastructures to be included in its Roadmap 2021

€4.1 billion investment in excellent science contributing to address European challenges

After two years of hard work, following a thorough evaluation and selection procedure, ESFRI proudly announces the **11 proposals** that have been scored high for their science case and maturity for implementation and will be included as new Projects in the **ESFRI 2021 Roadmap Update**.

About the ESFRI Roadmap
ESFRI has established a European Roadmap for Research Infrastructures (new and major upgrades, pan-European interest) for the next 10-20 years, stimulates the implementation of these facilities, and updates the roadmap as needed. The ESFRI Roadmap arguably contains the best European science facilities based on a thorough evaluation and selection procedure. It combines ESFRI Projects, which are new Research Infrastructures in progress towards implementation, and ESFRI Landmarks successfully implemented Research Infrastructures enabling excellent science.

EuPRAXIA – Project Spin-off

The European Plasma Accelerator Facility – Press Release



The screenshot shows the ESFRI website's press release page. At the top left is the ESFRI logo. Navigation links include 'ABOUT', 'ESFRI ROADMAP', and 'EVENTS'. A breadcrumb trail reads 'HOME > NEWS > LATEST ESFRI NEWS'. The main headline is 'ESFRI announces new RIs for Roadmap 2021'. Below this is a featured image of a document cover titled 'New RIs for Roadmap 2021 announced' with the subtitle 'Strategy Report on Research Infrastructures ROADMAP 2021'. To the right of the image, the text of the press release is visible, including the date '30.06.2021', the type 'PRESS RELEASE', and the main announcement: 'ESFRI announces the 11 new Research Infrastructures included in its Roadmap 2021'. A sub-headline states '€4.1 billion investment in excellent solutions to European challenges'. The body text begins with 'After two years of hard work, following a rigorous selection procedure, ESFRI proudly announces that 11 new RIs have been scored high for their scientific excellence, their implementation and will be included in the 2021 Roadmap Update.'

The new ESFRI Projects are:

- **EBRAINS** - European Brain ReseArch INfrastructureS, a distributed digital infrastructure at the interface of neuroscience, computing and technology, offering scientists and developers advanced tools and services for brain research.
- **EIRENE RI** - Research Infrastructure for EnviRonmental Exposure assessment in Europe, the first EU infrastructure on human exposome (environmental determinants of health).
- **ET** - Einstein Telescope, the first and most advanced third-generation gravitational-wave observatory, with unprecedented sensitivity that will put Europe at the forefront of the Gravitation Waves research.
- **EuPRAXIA** - European Plasma Research Accelerator with Excellence in Applications, a distributed, compact and innovative accelerator facility based on plasma technology, set to construct an electron-beam-driven plasma accelerator in the metropolitan area of Rome, followed by a laser-driven plasma accelerator in European territory.

EuPRAXIA – Project Spin-off

The European Plasma Accelerator Facility – Press Release

The new ESFRI Projects are:

- **EuPRAXIA** - European Plasma Research Accelerator with Excellence in Applications, a distributed, compact and innovative accelerator facility based on plasma technology, set to construct an electron-beam-driven plasma accelerator in the metropolitan area of Rome, followed by a laser-driven plasma accelerator in European territory.

generation gravitational-wave observatory, with unprecedented

- There is a **new level of ambition** to develop globally unique, complex facilities for frontier science: Einstein Telescope – highest value project ever on the Roadmap - EUR 1.900 million, and EuPRAXIA – innovative accelerator based on plasma technology - EUR 569 million.

accelerator in European territory.



ABOUT

HOME > NEWS > LATEST ESFRI NEWS

ESFRI announces new RIs for R



30.06.2021

PRESS RELEASE

ESFRI announces new RIs included in its

€4.1 billion in European challenge

After two years of selection process, 10 projects have been selected for implementation

2021 Roadmap Update.

Ongoing: European Strategy Expert Panel

Defining a European Particle Physics Roadmap for High-Gradient Novel Accelerators

Expert Panel – Panel chairs:

Chair: Ralph Assmann (DESY/INFN)

Deputy Chair: Edda Gschwendtner (CERN)

Panel members:

Kevin Cassou (IN2P3/IJCLab), Sebastien Corde (IP Paris), Laura Corner (Liverpool), Brigitte Cros (CNRS UPSay), Massimo Ferrario (INFN), Simon Hooker (Oxford), Rasmus Ischebeck (PSI), Andrea Latina (CERN), Olle Lundh (Lund), Patric Muggli (MPI Munich), Phi Nghiem (CEA/IRFU), Jens Osterhoff (DESY), Tor Raubenheimer (SLAC), Arnd Specka (IN2PR/LLR), Jorge Vieira (IST), Matthew Wing (UCL).

Panel associated members:

Cameron Geddes (LBNL), Mark Hogan (SLAC), Wei Lu (Tsinghua U.) , Pietro Musumeci (UCLA)

Final report being completed



Conclusion

- WP6 so far fully on track
- EAAC`21 successfully organized in a hybrid format
- Outstanding results reported. For example, first FEL lasing with electrons from a plasma accelerator, high energy protons from a plasma accelerator irradiating cancer, ...
- WP6 leaders and members heavily involved in European strategic efforts: EuPRAXIA, European Strategy for Particle Physics.

iFAST



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under GA No 101004730.