WP6: Novel Particle Accelerators
Concepts and Technologies

1st Steering Meeting, 25 June 2021, Zoom

Ralph Assmann, DESY & LNF/INFN
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 Thaury): 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

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

• This is the iFAST WP on high gradient accelerators (> 1 GV/m), involving mainly plasma-based technology but also dielectric accelerators.

• This includes the development of laser features required for driving accelerators and targets.

• This WP: Promote and support the development of very high gradient, compact accelerators as a viable technology option!

• Towards HEP but also near-term applications.
Ongoing: European Strategy Expert Panel

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 Ferarrio (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)
Ongoing: European Strategy Expert Panel

OPEN CONSULTATION PROCESS – WORK FLOW

**Expert Panel:** 18 experts - 4 associated - 14 meetings

- Email list: 231 scientists registered to roadmap process
- **Townhall 30/3:** Setting the scene, explaining the process, HEP goals and targets
- Parameters: Parameters of interest, proposal of 2 common study cases

**Townhall Meetings 21/5 and 31/5**

Input presented by 48 SPEAKERS FROM COMMUNITY
Up to 130 simultaneous participants

**FINAL REPORT**

October

Townhall #4 feedback
LDG, SPC, ... feedback

Draft R&D Roadmap, deliverables: July

Ralph Assmann – WP6 – I.FAST Steering Meeting June 2021
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 50 people to attend in-person at the LNF-INFN, in Frascati (Rome, Italy). Please consider that the final number of acceptance for onsite participation is related to the COVID-19 restrictions and can change in the meantime. The acceptance will be based on the registration time and on Institution Representatives and will be communicated at the beginning of September 2021.

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 5th EAAC will be followed by a half day EuroNNAC network meeting by invitation only (September 23th).

EAAC2021 scope:
- High gradient and multibunch acceleration in metallic structures (C-X-band and beyond) with innovative power generation schemes
- Plasma accelerators driven by modern lasers
- Plasma accelerators driven by electron beams
- Plasma accelerators driven by proton beams
- Dielectric structures and other novel technologies
- Novel schemes using advanced technologies (table-top FEL, plasma linear collider, medical imaging ...)
- Computations for Accelerator Physics
- Advanced beam diagnostics for beams and plasma
- Laser technology for advanced accelerators

**Application** for this event is currently open.

*Apply now*
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 facilities. The most cost effective and compact methods for generating high energy particle beams shall be reviewed and assessed. This includes diagnostics methods, timing technology, special needs for injectors, beam matching, beam dynamics with advanced accelerators and development of adequate simulations.

This workshop is organized in the context and with sponsoring of the EU/I-FAST funded European Network for Novel Accelerators (EuroNNAc4), a network of more than 60 institutes and universities. Additional sponsors for EAAC2021 include at the moment CERN, DESY and INFN. Given the impact of the Corona pandemic, NO program of student sponsoring will be offered in 2021.

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- Computations for Accelerator Physics Advanced beam diagnostics for beams and plasma
- Laser technology for advanced accelerators

Workshop supported by EU via ARIES, GA 730871
Ongoing: EAAC 2021 \( \rightarrow \) \textit{thanks to LOC & Laura}

**Workshop Organizing Committee (WOC)**

Ralph Assmann, \textit{(DESY, Germany and INFN-LNF, Italy), co-chair}
Massimo Ferrario, \textit{(INFN - LNF, Italy), co-chair}
Laura Corner, \textit{(University of Liverpool, United Kingdom), SPC chair}
Bernhard Holzer, \textit{(CERN, Switzerland)}
Phi Nghiem \textit{(CEA, France)}
Arnd Specka, \textit{(Ecole Polytechnique, France)}
Roman Walczak, \textit{(JAI, United Kingdom)}

**Local Organizing Committee - LoC**

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Alessandro Gallo \textit{(INFN - LNF, Italy)}
Fabio Villa \textit{(INFN - LNF, Italy)}
Giulia Vinicola \textit{(INFN - LNF, Italy)}

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Bernhard Holzer, \textit{(CERN, Switzerland)}
Phi Nghiem, \textit{(CEA, France)}
Arnd Specka, \textit{(Ecole Polytechnique, France)}
Roman Walczak, \textit{(JAI, United Kingdom)}
Being finalized

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Matthew Wing, (University of London/Imperial College, United Kingdom)
Makina Yabashi, (RIKEN SPriNt-8, Japan)
Matt Zepf, (University of Jena, Germany)
Arie Zigel, (Hebrew University of Jerusalem, Israel)
Ongoing: LASPLA

IFAST Task 6.2 (LASPLA): Objectives

- Establish a roadmap to foster delivery of advanced industrial laser drivers with high-repetition rate and higher efficiency, for the first user plasma-based accelerator.
- Establish a coordination activity with networking and training of main laser labs, focused on laser-driver R&D.


Thanks to Leo Gizzi, CNR
Ongoing: LASPLA

1st Technical meeting - 23rd June, 2021 - 10.00 a.m. CEST

10.00 - "Introduction about IFAST/LASPLA" - Leo GIZZI/CNR, Italy

10.20 - "Overview of Laser Technology Developments @ CLF" - Paul MASON/STFC, UK

10.40 - "First acceleration experiments on Apollon" - Francois MATHIEU/CNRS Apollon, France

11.00 - "Overview of laser technology developments @ Thales" - Christophe SIMON BOISSON/THALES, France

11.20 - "New materials for pulse amplification at 1 and 2 microns" - Guido TOCI/CNR-INO, Italy

11.40 - "Tm:Lu2O3 amplifier design issues" - Luca LABATE/CNR-INO, Italy

12.00 - "Challenges for diode laser pump sources: high intensity & high repetition rate & efficient & low €/W" - Paul CRUMP/FB, Germany

12.20 - Discussion and next meeting/conference - All

12.30 - Close

Thanks to Leo Gizzi, CNR
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