



Philip Burrows, Director, John Adams Institute for Accelerator Science
University of Oxford

I.FAST 2nd annual meeting, 19.04.2023

WP2 mission and objectives

Mission:

- Create an innovation-based community for particle accelerators, and outreach to public

Objectives:

- Develop a communication strategy for particle accelerators
- Set up a Challenge-Based Innovation (CBI) scheme
- Launch an Industrial Training scheme associated with Knowledge Transfer (KT)

WP2 organisation

Task 2.1: Management

UOXF, CERN, CNRS, UU

Task 2.2: Communications & Outreach

CERN, GSI

Task 2.3: Challenge Based Innovation

CNRS, CERN, UOXF, ESI

Task 2.4: Industrial Training with Knowledge Transfer

UU, CEA, CERN, CIEMAT, CNRS, DESY, INFN

Summary of activities in P1

- Defined a communication strategy, including a social media strategy and a network of communication contacts:

Project website for public dissemination: ifast-project.eu

Quarterly newsletter of the accelerator community: *Accelerating News*
(<https://acceleratingnews.eu/>)

Beneficiaries' communication channels: websites, newsletters, social media (#IFASTProjectEU), press offices

- Provided communication tools (web site, SharePoint site), dissemination (Zenodo platform), and outreach tools (web site, Accelerating News), both internal and external, required to address the project's goals.



Innovation Fostering in Accelerator Science and Technology

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I.F.AST

Building SMA18 (near SM18), a storage area for either test magnets for the HL-LHC or spare magnets for the LHC. (Image: CERN)

Innovation Fostering in Accelerator Science and Technology (I.F.AST)

Particle accelerators currently face critical challenges related to the size and performance of future facilities for fundamental research, to the increasing demands coming from accelerators for applied science, and to the growing applications in medicine and industry.

I.F.AST aims to enhance innovation in the particle accelerator community, mapping out and facilitating the development of breakthrough technologies common to multiple

Issue 37

August 2021

Welcome to Issue #37 of Accelerating News!

This rather full summer issue of the newsletter brings you the latest developments in superconductivity and magnets for the different projects ongoing at CERN, news from different particle accelerator facilities and European projects, reports from the events of the past months, and a feature on the transfer of technology from CERN to medical applications.

EASITrain and QUACO — two projects co-funded by the European Commission for the development of technologies aimed at the Future Circular Collider and High-Luminosity LHC, respectively — bring us new developments on superconducting materials. Internationally, the Uppsala University is upgrading its FREIA Laboratory to test superconducting magnets and crab cavities for the HL-LHC. Developments for wakefield accelerators and linacs also feature in this issue with two scientific updates on innovative techniques.

Other European projects' updates are varied. They include the new ways of training early-career researchers established by AVA, the prospective EuPRAXIA plasma-based accelerator included in a strategic roadmap for Research Infrastructures, the I.FAST efforts in implementing additive manufacturing technologies within the project and its knowledge transfer efforts in the collaboration between laboratories and industry. Also on the topic of knowledge transfer, CLEAR demonstrates how very high-energy electron beams can be focused onto deep-seated cancerous tumours.

An interview with Lucio Rossi, former coordinator of the HL-LHC project, on a recent initiative from INFN highlights some of the ways the accelerator community collaborates.

In this issue, we also announce the CERN Accelerator School 2021 (25 September - 8 October 2021) and report on the ninth edition of MeVArc (8-12 March 2021), the Heavy Ion Therapy Masterclass School (17-21 May 2021) and the FCC Week 2021 (28 June - 2 July 2021), the latter of which includes a report on the Collider Diaries, focusing on the lives of five scientists.

Finally, some internal news: after two years as editor-in-chief of Accelerating News, I have moved on to a new position at CERN. I would like to take this opportunity to thank the newsletter's editorial team and editorial board for their incredible support, and to all the projects' teams who contribute to the newsletter with their groundbreaking developments. I could not have asked for a better way to learn about the activities of this very dynamic community. A new editor-in-chief will be announced in the next issue.

I hope you enjoy the next issue and wish you (for one final time) a happy reading!

Daniela Antonio, Editor-in-Chief



Editorial

Highlights

Issue

Feature



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EASITrain and QUACO — two projects co-funded by the European Union — are working on new materials. Internationally, the Uppsala University is developing crab cavities for the HL-LHC. Developments and scientific updates on innovative techniques.

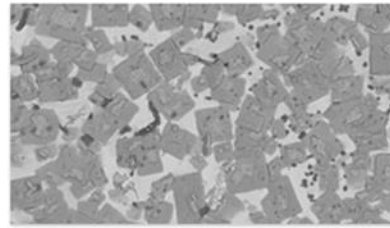
Other European projects' updates are varied. The AVA, the prospective EuPRAXIA plasma-based FEL, and I.FAST efforts in implementing additive manufacturing. The collaboration between laboratories and industry, and how very high-energy electron beams can be focused.

An interview with Lucio Rossi, former coordinator of the ways the accelerator community collaborates.

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Finally, some internal news: after two years of the COVID-19 pandemic at CERN, I would like to take this opportunity to thank you for your support, and to all the projects' teams who continue to work hard. I have not asked for a better way to learn about the projects, but I will announce in the next issue.

I hope you enjoy the next issue and wish you (



Thallium-based superconducting films have proven the capability for the FCC beam screen

Within the EASITrain project, thallium-based superconducting thin films for the Future Circular Collider beam screen have been fabricated. Their capability proven, a new project has been started to understand the actual feasibility of the coating.

Issue 37 | Future Circular Collider (FCC) | 11 August, 2021



FCC Week 2021: Looking at the project and the people who bring it to life

This summer, the 2021 Future Circular Collider (FCC) Week took place online and attracted more than 700 participants. At the same time, the Collider Diaries follow 5 scientists and engineers who contributed to its superconducting a

Issue 37 | Future Circular Collider (FCC) | 11 August, 2021



I.FAST announces Traineeship Programme at European Accelerator Development Laboratories

The EU-supported project I.FAST announced a traineeship programme to support knowledge transfer of new component technologies between laboratories and industry.

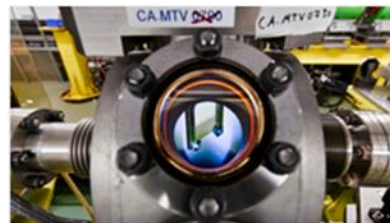
Issue 37 | I.FAST (IFA) | 06 August, 2021



I.FAST project to position additive manufacturing for accelerator technologies

Additive manufacturing is at the heart of industry 4.0. Recognising its potential, the I.FAST project, funded by the European Union Horizon 2020 program, has the objective of promoting it within the advanced accelerator technologies.

Issue 37 | I.FAST (IFA) | 29 July, 2021



Unravelling the mysteries of vacuum arcs – 9th MeVArc held successfully

In Spring 2021, the 9th workshop dedicated to vacuum arcs MeVArc took place online – it aims at better understanding how electric discharges occur in vacuum.

Issue 37 | I.FAST (IFA) | 29 July, 2021



A report from the Heavy Ion Therapy Masterclass School

The Heavy Ion Masterclass (HITM) school that took place from the 17-21 of May 2021. This full-week course was the first event of the EU co-funded HITRIplus project (Heavy Ion Therapy Research Integration).

Summary of activities in P1

- Organised and ran the 1st Challenge-Based Innovation event of I.FAST: selection of topic, call for applications, selection of the 24 participants, definition of the programme, management and coaching during the event, ranking of the selected projects.

PARTICLE ACCELERATORS FOR THE ENVIRONMENT

Join a ten-day challenge for
senior bachelor's & master's level students
(all backgrounds)

In Archamps, France
(near Geneva, Switzerland)

From 26 July to 4 August 2022

APPLY NOW

Deadline: 14 February 2022

More details: www.ifast-cbi.particle-accelerators.eu





Team	Project	Description
White Light	AMMIRA Accelerators for Marine Microplastics Investigation & Research	compact synchrotron source mounted on a retrofitted research ship to analyse microplastics in marine environment
Fellowship of the Accelerator Ring	Durablade - Accelerating the Green Transition	using an electron accelerator to engineer an irradiated nanofiber composite to improve the longevity of turbine blades for wind power
Human Beams	CYAN	e-beam based technique to stop eutrophication (harmful algal bloom) in lakes
Wave Turners	Soil Saviour 2.0	portable facility based on an e-beam accelerator for decontamination of soil from medium and heavy hydrocarbons



I.FAST 2nd annual meeting



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Accelerating solutions for the environment

In the summer of 2022, an EU-backed project challenged students to find novel environmental and societal applications for particle accelerators.



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In what ways can particle accelerators tackle environmental issues? Looking for fresh ideas, the EU-funded I.FAST [project](#) brought together students from all over Europe to explore new solutions.

The 10-day challenge was the first edition of I.FAST's Challenge-Based Innovation (CBI) programme. Held at the European Scientific Institute in Archamps, France, from 26 July to 4 August, it gathered 23 students covering 17 nationalities enrolled in bachelor's and master's programmes with a multitude of academic backgrounds.

Related projects



PROJECT

I.FAST

Innovation Fostering in Accelerator Science and Technology

31 December 2022

Summary of activities in P1

- Published the call for the Industrial Training scheme associated with Knowledge Transfer and selected the Committee to steer the process and to review applications.
- Demand so far modest (3 applics.)
- Call was extended in scope and re-issued.



I.FAST

I.FAST announces Traineeship Programme at European Accelerator Development Laboratories

The EU-supported project I.FAST announced a traineeship programme to support knowledge transfer of new component technologies between laboratories and industry.

6 AUGUST, 2021 | By Tord Ekelöf (Uppsala U.)



I.FAST Traineeship Programme for engineers and technicians at European Industrial Companies to work at an I.FAST European Accelerator Development Laboratories (Image: CERN)

The programme offers the opportunity for an early-career engineer or technician working at a European industrial company to work as trainee at one of the I.FAST [European Accelerator Development Laboratories](#) for a duration of 2 weeks to 3 months. The traineeship should put emphasis on knowledge transfer in the development, design and testing of new advanced technological components for frontline accelerator and magnet research infrastructures.

The programme covers the costs for the duration of the traineeship of:

- Salary
- Travel
- Subsistence

Application process

NEWS CATEGORIES

Particle Accelerators

High-Luminosity LHC

Compact Linear Collider

Future Circular Collider

Communication & Outreach

ARIES

IFAST

EuPRAXIA

EASITrain

Knowledge Transfer



Deliverables and Milestones P1

Task 2.1: Management:

- MS4 (M2): WP2 Task Leaders' Kick-off meeting **ACHIEVED**

Task 2.2: Communications & Outreach

- D2.1 (M6): Communication strategy **ACHIEVED**
- MS5 (M18): Accelerator Communications and Outreach (ACO) Workshop **Spring 2023**

Task 2.3: Challenge Based Innovation

- MS6 (M12): Definition of CBI scheme: proposed topic and organisation at ESI **ACHIEVED**

Task 2.4: Industrial Training with Knowledge Transfer

- MS7 (M6): Expert Committee set up and industrial training scheme call **ACHIEVED**

Remaining Deliverables and Milestones

Task 2.2: Communications & Outreach

- MS5 (**M18**): Accelerator Communications and Outreach (ACO) Workshop
→ **Spring 2023**

Task 2.3: Challenge Based Innovation

- D2.2 (**M24**): Report on CBI scheme

Task 2.4: Industrial Training with Knowledge Transfer

- D2.3 (**M24**): Report on Training scheme

Relevance of objectives and impact

- Training, communications and outreach remain high-priority activities
- Accelerating News is a high-quality vehicle for dissemination within the accelerator community
- Upcoming Communicators' workshop will help to coordinate and enhance broader dissemination of I.FAST activities + achievements
- Challenge-Based Innovation scheme has been widely publicised and appreciated (see CORDIS article)
- Talk at International Particle Accelerator Conference, May 2023:
'Challenging students into developing accelerator-based innovations to protect the environment'

Training landscape

Training is becoming increasingly recognised as an important element of coordinated plans for advancing accelerator R&D in Europe (and beyond)

Governments increasingly concerned about highly-skilled workforce for economic benefit – we have our part to contribute

EC strongly promotes aspects of training via eg. Marie Skłodowska-Curie actions

Many accelerator-related proposals to EC have embedded training functions:

TIARA, EUCARD, AMICI, ARIES, I.FAST ...

FCC.IS, EURO-LABS, EJADE, EAJADE ...

Training is a big topic

- Community:
Physicists / engineers / technicians ...
- Academic level:
Undergraduate / Master's / PhD / staff ...
- Delivery:
Lectures, seminars, lab work, 'on the job' ...
- Institutions:
Universities, national + international labs, facilities, accelerator schools ...
- How many trained people do we need?
How does this help society more generally?

Recent activities

TIARA, AMICI, ARIES + I.FAST delivered:

training surveys (2012 and 2020) → excellent snapshots

ARIES Training Survey

https://edms.cern.ch/ui/file/1816951/1.0/ARIES-Del-D2.3_Final.pdf



ARIES

Accelerator Research and Innovation for European Science and Society
Horizon 2020 Research Infrastructures GA n° 730871

DELIVERABLE REPORT

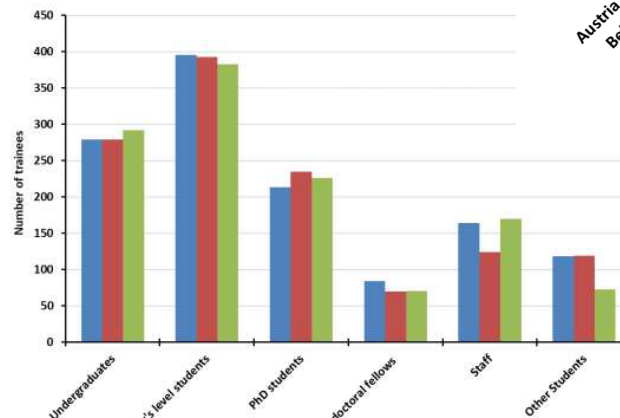
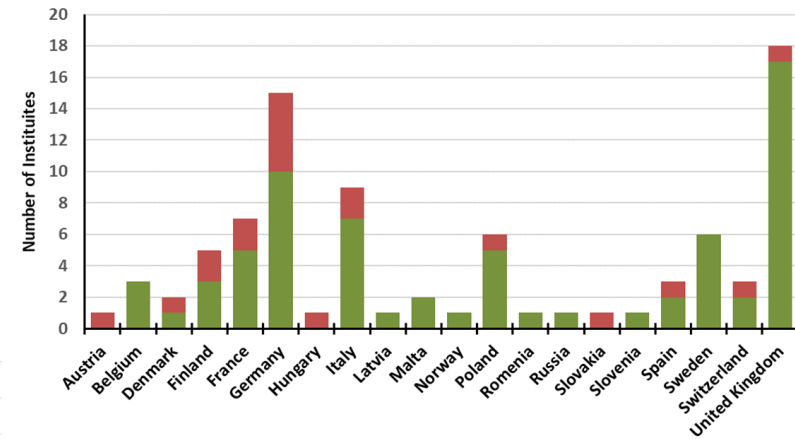
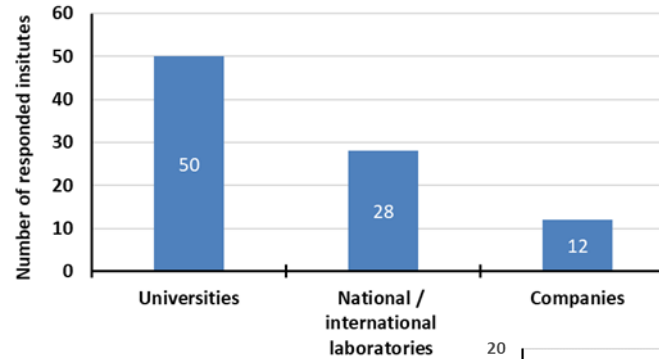
Final report on coordination of training activities

DELIVERABLE: D2.3

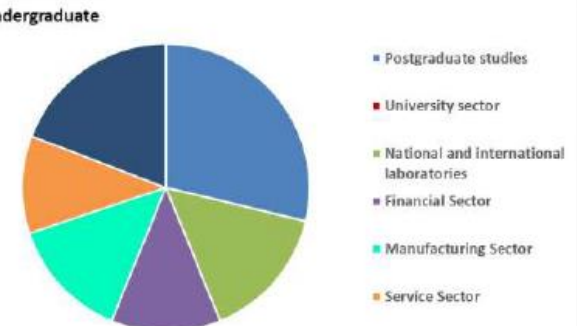
Document identifier:	ARIES-D2.3
Due date of deliverable:	End of Month 39 (July 2020)
Justification for delay:	Delay due to COVID19
Report release date:	30/09/2020
Work package:	WP2: Coordination, support and enhancement of training activities for accelerators in Europe
Lead beneficiary:	ESS
Document status:	Final

ABSTRACT

This report describes the extent of ongoing proposed training activities on particle accelerators in Europe, as well as their coordination and interaction. The data used for the report is collected by carrying out a web-based survey. In total, 90 institutes and companies from 21 countries have participated in the ARIES survey on "Training in Accelerator Science". Out of 90 responders, 50 responders were universities, 28 responders were national and international laboratories and 12 were companies. The report presents the provision of training, trainee numbers, training time, training subjects of the responding institutes, including training needs of companies. Coordination of training activities – accelerator schools, developments of MOOCs and use of facilities – is also outlined.



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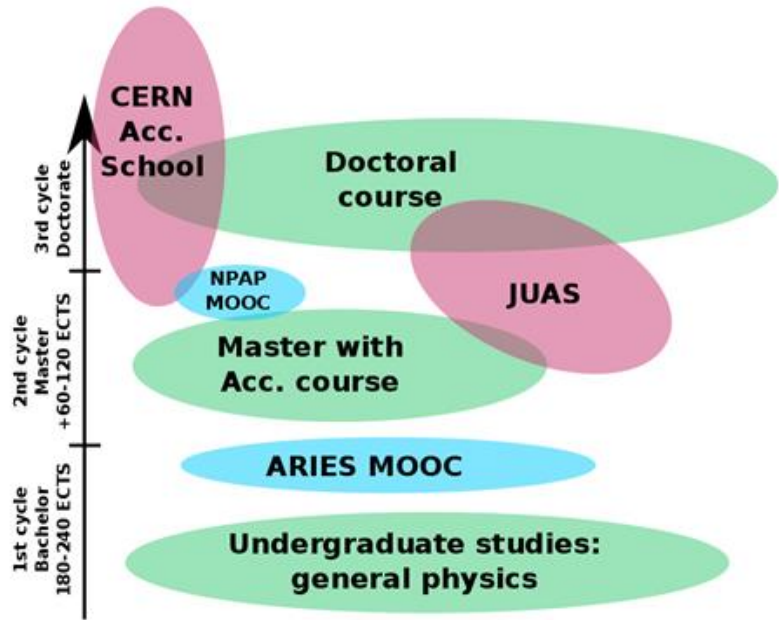


Recent activities

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training surveys (2012 and 2020) → excellent snapshots

‘MOOC’ on introduction to accelerator science
(also Nordic MOOC)



Tatiana Pieloni (EPFL)

$$\left. \begin{aligned} t' &= \gamma(t - vx/c^2) \\ x' &= \gamma(x - vt) \\ y' &= y \\ z' &= z \end{aligned} \right\}$$

RELATIVISTIC GAMMA FACTOR $\gamma = \frac{1}{\sqrt{1 - v^2/c^2}}$



APPLICATIONS OF ACCELERATORS

- Colliders for High Energy Physics
- Material analysis
- Health applications
- Industrial applications

ACCELERATORS HAVE A VERY IMPORTANT, BUT OFTEN UNSEEN, IMPACT ON OUR EVERYDAY LIVES

Angeles Faus-Golfe (CNRS)

Electron beam processing

- Electron accelerators are producing beams of energy from 80 keV up to 10 MeV.

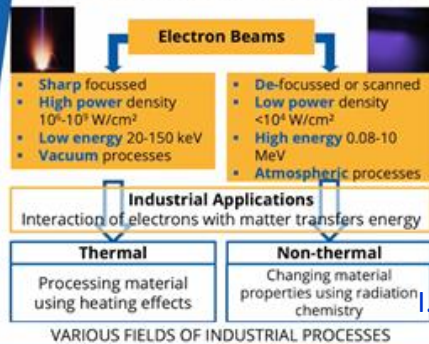
Dagmara Smietanko (INCT, Warsaw)

OVER 2500 INDUSTRIAL ACCELERATORS ARE WORKING OVER THE WORLD

Frank Holm Roegner (Fraunhofer Institute)



INDUSTRIAL APPLICATIONS



FAST 2nd annual meeting



Recent activities

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‘MOOC’ on introduction to accelerator science
(also Nordic MOOC)

Challenge-Based Innovation scheme ‘accelerators for the
environment’

industry – lab trainee exchange scheme

Accelerator schools (CAS, JUAS ...) are thriving

Accelerating News is spreading the word!

Summary + synthesis

Within + beyond our universities/labs a lot of great accelerator training is being delivered

Activities are necessarily focussed on targeted, affordable schemes

Within EU projects training is usually 'project-specific' + resources typically limited

Some communities are well-organised + well-served (PP, NP)

Broad family of accelerator interests, including light + neutron sources + applications:

- medical, industrial, security, energy ...

Useful to have a broader + more complete overview of training activities + needs

- share knowledge, experience and resources
- identify (and bridge) the gaps

Build better connections with relevant communities:

- detector/instrumentation, LEAPS, fusion, medical ...

Can always do better and deliver more (efficiently)!

Proposal

Recognising:

Well-established framework for coordination that TIARA provides

Ongoing discussions with European Commission on future coordinating activities

Lab Directors' Group Roadmap, with recognition of importance of training

ECFA has set up an 'Instrumentation Education and Training Panel' (with a link to accelerator community)

Set up a working group on accelerator training across Europe

Membership should represent the broad spectrum of accelerator institutes/labs/facilities/universities + industry: PP, NP, light sources, neutron sources, fusion ...

Include 'applications': medical, industrial, energy, security ...

Draw on expertise of both training providers + 'customers'

Proposed working group remit

- Provide a framework for discussion of training needs + training provision
- Explicitly engage stakeholders across the broad accelerator community
- Provide links to other relevant communities (ECFA/detectors, LEAPS ...)
- Share knowledge/experience of training activities for common benefit
- Promote synergies + cooperation, and (where applicable) sharing of resources
- Identify skills shortages and needs for enhanced/augmented training schemes
- Provide a strong training pillar for developing possible future bids to EC
- Support (and where possible enhance) well-running activities: universities, CAS, JUAS ...

iFAST

Thank you for your attention!



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