

# I.FAST

1<sup>st</sup> ANNUAL  
MEETING

2-6 MAY 2022

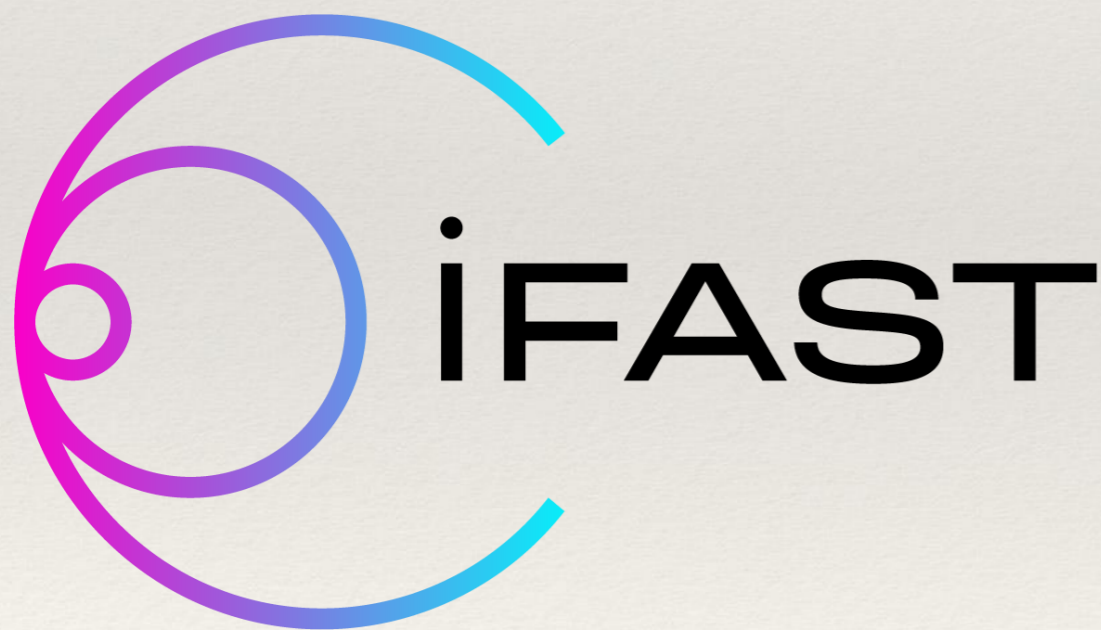
CERN Globe of Science,  
Geneva, Switzerland

The **I.FAST** (Innovation Fostering in Accelerator Science and Technology) Innovation Pilot project for the Particle Accelerator community is organising its first Annual Meeting in Geneva, Switzerland, hosted by CERN. The project as well as the activities and recent results of the different Work packages will be presented.

Registration: [indico.cern.ch/event/1133254/](https://indico.cern.ch/event/1133254/)



## The TIARA strategy for support to accelerator R&D



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# Outline



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2. Our aim as coordinators of a consolidated community

# 1. Introduction

## 1. Accelerator Science and Technology

Accelerators are fundamental for Basic Science:



LINAC4



LHC



ESS



E-XFEL



IFMIF

ESFRI Projects	
Energy	IFMIF-DONES
Phys S. & Eng	EuPRAXIA

ESFRI Landmarks	
(out of 41)	ELI ERIC
	ESRF
	ESS ERIC
	European XFEL
	FAIR
	HL-LHC
	ILL
	SPIRAL2

Acc Sc&T : technological components for key scientific instrumentation

# 1. Introduction

## 1. Accelerator Science and Technology

But accelerators are not only essential for Basic Sciences:

- Without accelerators, major advances in the biosciences of the past 50 years would not have happened,
- Accelerator technology stimulates a better understanding of living processes, leading to new medicines and therapies.
- Accelerated particle beams play a growing role of commercially important products, (next generation of electronics, advanced engineering, smart materials).
- Technology based on accelerators helps to solve environmental problems and
- Energy (example: new generation nuclear energy).

*Applications of Particle Accelerators in Europe. Eucard 2, 2017*

# The impact of accelerators on Society

Fundamental physics  
Materials science  
Solid state and condensed matter physics  
Biological and chemical science  
Research

Cleaning flue gases of thermal power plants  
Energy & Environment

Treating cancer  
Medical imaging  
Health & Medicine

Ion implantation for electronics  
Hardening surfaces & materials  
Welding and cutting  
Treating waste & medical material  
Food preservation  
Industrial applications

Cultural heritage  
Authentication  
Cargo scanning and security  
Material characterisation

Cleaner and safer nuclear power  
Technologies for fusion  
Replacing ageing research reactors  
Prospects



**Materials research**  
Beams of photons, neutrons and muons are essential tools to study materials at the atomic level.

**Protein modelling**  
Synchrotron light allows scientists to solve the 3D structure of proteins e.g. the Chikungunya virus.

**Controlling power plant gas emission**  
In some pilot plants, electron beams are used to control emission of sulphur and nitrogen oxides.

**Hadron therapy**  
Proton and ion beams are well suited for the treatment of deep seated tumours.

**Positron Emission Tomography (PET)**  
Radioisotopes used in PET-CT scanning are produced with accelerators.

**Ion implantation for electronics**  
Many digital electronics rely on ion implanters to build fast transistors and chips.

**Hardening materials**  
Replacing steel with X-ray cured carbon composites can reduce car energy consumption by 50%.

**Cultural heritage**  
Particle beams are used for non-destructive analysis of works of art and ancient relics.

**Energy**  
Accelerator technologies may bring the power of the sun "down to earth", treat nuclear waste and allow for safer operation of reactors.

## 2. A picture of our community

### 1. A detailed view of our Science and Technology field.

#### Application fields related to accelerator S&T

#### Accelerator S&T map and applications. A two dimensional relation

Field/ community	Identified body
Particle Physics	<a href="#">ECFA</a>
Nuclear physics	<a href="#">NuPECC</a>
Light sources and FELs	<a href="#">LEAPS</a>
Neutron sources	<a href="#">LENS</a>
Medical applications	<a href="#">ENLIGHT, PTCOG</a>
ADSR (nuclear reactors)	<a href="#">(MYRRHA)</a>
Fusion energy	<a href="#">F4E,</a> <a href="#">EUROFusion</a>

	Particle Physics	Nuclear physics	Light sources and FELs	Medical Applic.	Neutron sources	ADSR	Fusion energy
<b>ACCELERATOR COMPONENTS</b>							
Sources and Injectors	X	X	X	X	X	X	X
RF structures	X	X	X	X	X	X	X
RF systems	X	X	X	X	X	X	X
SC magnets	X	X	X	X	X	X	X
Conventional NC magnet systems		X	X	X	X		
Diagnostics and instrumentation	X	X	X	X	X	X	X
Targetry	X	X			X	X	X
Radiation issues	X	X	X	X	X	X	X
<b>ACCELERATOR TECHNOLOGIES</b>							
Electronics and Software	X	X	X	X	X	X	X
UHV	X	X	X	X	X	X	X
RF sources	X	X	X	X	X	X	X
Cryogenics	X	X	X	X	X	X	X
Alignment and Stabilization	X	X	X	X	X	X	X

## 2. A picture of our community

### 2. TIARA. Who we are, who we represent to

Instituion	Short name	Country
Commissariat à l'Énergie Atomique et aux Énergies Alternatives	CEA	France
European Organization for Nuclear Research	CERN	International
Centre National de la Recherche Scientifique	CNRS	France
Centro de Investigaciones Energeticas, Medioambientales y Tecnológicas	CIEMAT	Spain
Stiftung Deutsches Elektronen-Synchrotron	DESY	Germany
GSI Helmholtzzentrum für Schwerionenforschung GmbH	GSI	Germany
Istituto Nazionale di Fisica Nucleare	INFN	Italy
Paul Scherrer Institut	PSI	Switzerland
Science and Technology Facilities Council	STFC	UK
Uppsala Universitet	UU	Sweden → Scandinavia
Instytut Fizyki Jadrowej – Krakow	IFJ PAN	Poland
RIGA Technical University	RTU	Latvia → Baltic Region



Roy Aleksan, CEA promoter of this idea

Memorandum of Understanding  
for  
the establishment of TIARA, a European Consortium of Research Institutions in the Particle Accelerator Research Area.

Among

1 COMMISSARIAT À L'ÉNERGIE ATOMIQUE ET AUX ÉNERGIES ALTERNATIVES, a French state-owned research institution with a scientific, technical and industrial activity (EPIC), whose registered office is located at 25 rue Leblanc, 75015 Paris, France and declared at the Paris Trade and Companies Register (R.C.S) under the number PARIS B 775 685 019, duly represented by its Director General, Dr. Gabriele FIONI, hereinafter referred to as "CEA",

2. EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, an Intergovernmental Organization whose seat is at Geneva, Switzerland, duly represented by its Director-General, Prof. Rolf-Dieter HEUER and/or its Director for Accelerators and Technology, Dr. Frederick BORDRY,

- Representative actors on Acc Sc & Tech at Europe.
- An open list! Keen to accept new members.

## 2. A picture of our community

### 2. Who we are and who we represent to

TIARA supports and coordinates the complete scope of accelerator R&D activities.

◆ TIARA main aim is to support the implementation of Accelerator R&D activities. It addresses :

- Generic R&D projects
- Project oriented R&D (Preparatory Phase)
- Education&Training activities
- Development and Access to R&D infrastructures
- Involvement of Industry

◆ TIARA aims to cover Trans-Field Activities (no only PP) since R&D in AS&T is transverse

◆ TIARA uses the Roadmaps/Priorities of various communities to guide its initiatives

- Also contributing to the definition of these roadmaps



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## 2. A picture of our community

### 3. A snapshot of our coordination activity

From ESGARD to TIARA: a long term history of activity for supporting projects:

Accelerator R&D Projects	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Project																							
FP6 CARE (IA)		X	X	X	X	X																	
FP7 EuCARD (IA)							X	X	X	X													
FP7 EuCARD2 (IA)										X	X	X	X	X									
H2020 ARIES (IA)																X	X	X	X				
H2020 HITRIplus (IA)																			X	X	X	X	
FP6 EUROTEV (DS)			X	X	X	X																	
FP6 EURISOL (DS)			X	X	X	X																	
FP7 EUROnu (DS)							X	X	X	X													
FP7 HiLumi (DS)																							
H2020 EuroCIRCOL (DS)																							
H2020 EuPRAXIA (DS)																							
H2020 ESSnuSB (DS)																							
H2020 CompactLight (DS)																							
H2020 FCC-IS (DS)																			X	X	X	X	
FP7 SLHC-PP (PP)						X	X	X															
FP7 ILC-HiGrad (PP)					X	X	X	X															
FP7 TIARA (PP)									X	X	X	X											
FP6 EUROLEAP					X	X	X																
H2020 IFAST(INNOV)																			X	X	X	X	
H2020 EASYTrain (MSC)													X	X	X	X							
H2020 Fusumatech (FET)													X	X									
HE EuroLABS (Infraserv)																				X	X	X	X

Integrated projects like IFAST: key for TIARA.

- >17 years programme in accelerator R&D
- >22 projects supported: Total cost >333M€ (EC contribution 123M€). High rate of success,
- >100 partners (labs, Uni., industry) in >21 countries involved
- Some of the of highest relevance: LINAC4, ELBE, FLASH, XFEL, ESS, HL-LHC, FAIR, ARIES/IFAST... Others on the way



## **2. A picture of our community**

### **3. A snapshot of our coordination activity**

**Example of last actions of TIARA from Jan 2022**

#### **Actions with EC:**

- **Jan 27: Meeting in Brussels with EC-RTD to review our aims and needs**
- **March 30: Attending the Stakeholder meeting on behalf of ASc&T**

#### **Discussion on new proposals and support of some of them:**

##### **Proposals to the INFRA-2022-DEV-01 call (design studies)**

- **MuCol (design of a Muon Collider complex in Europe)**
- **ESSnuSB 2nd DS (neutrino oscillation and CP violation)**
- **CREATE (Compact and Resource-Efficient Accelerator Technologies)**
- **PRESTO (Storage Ring for Charged Particle EDM Searches)**

#### **Strategy aspects under discussion:**

- **Continuation of an accelerator science integrated projects.**
- **Next actions on Advanced Particle Therapy**
- **Next actions on ASc&T for environmental applications and energy**

### 3. Our aspiration as community

#### 1. Our complementarities. Coordination actions

TIARA scope: integrated Science and Technology R&D on accelerators

TIARA ROLE: to coordinate the integrated needs in ASc&T, at 2 dimensions:

- Technologies: the whole range of technologies affecting Accelerators
- Application fields: the need on accelerator R&D of any field, community, related with the use of accelerators (not only basic Science).

For such, it is essential a proper coordination with the other consolidated communities. Actions done so far or ongoing (via projects like IFAST)

1. Coordinated innovation community-oriented pilot project calls
2. Bilateral continuous contacs
3. MoC (INFRAINNOV-04-2020)

#### The Innovation Pilot in the RI Workprogramme

Horizon2020 call «**INFRAINNOV-04-2020: Innovation pilots**» that foresees 3 projects of **10 M€** each addressing innovation in 3 domains: light source technologies, detector technologies, **accelerator technologies**.

**Non-competitive** call, each community is expected to submit one project that will be approved if evaluated beyond an acceptance threshold.

##### TIMELINE:

- Expected call opening **28 November 2019**
- Deadline for submission **17 March 2020**
- Result of EC evaluation end of 2020
- Project start **1 May 2021** (at end of ARIES)
- Duration 4 years (2021 – 2025)

Potential problem:

The details of the call will be known only in 2 days (Thursday 28.11).

In case on new unexpected instructions we might need to make some modifications in the structure of the project.

**EAPS** League of European Accelerator-based Photon Sources

INFRA-INNOV Coordinators - TelCo 2 - Agenda

#### Coordinators TelCo

LEAPS-INNOV, ARIES, AIDA2020, ATTRACT

#### Agenda

Jan 08, 2020 (11:00 – 12:00) CET

Please dial 0049 40 8998 1318

Participants			
Y, LEAPS- INNOV	Elke Plönjes	DESY, AIDA2020	Felix Sefkow
Y, LEAPS- INNOV	Ute Krell	CERN, ARIES	Maurizio Vretenar
Y, LEAPS- INNOV	Julia Hauk	CERN, ATTRACT	Pablo Garcia Tello
R, CALIPSOplus	Barbara Schramm	CERN, ARIES, AIDA2020	Svetlomidir Stavrev
LEAPS- INNOV	Elizabeth Shotton	CIEMAT, ARIES	José Manuel Perez
F, LEAPS- INNOV	Ed Mitchell	ALBA, LEAPS- INNOV	Alejandro Sanchez

INFRAINNOV-04 MoC

#### INFRAINNOV-04-2020 Memorandum of Cooperation ("MoC")

**BETWEEN:** the members of the consortium implementing the Advancement and Innovation for Detectors and Accelerators Project ("AIDAInnova"),

**AND:** the members of the consortium implementing the Innovation Fostering in Accelerator Science and Technology Project ("IFAST"),

**AND:** the members of the consortium implementing the League of European Accelerator based-Photon Sources Innovation Project ("LEAPS-INNOV"),

Hereinafter collectively referred to as the "Projects" and individually as a "Project", in each case represented by the Project Coordinator for the purposes of the signature of this MoC.

**WHEREAS:**

### 3. Our aspiration as community



**Our aim for coordination of a consolidated community:**

**to continue acting as the support to institutions and stakeholders in terms of the coordination of the community.**

**But, for effectively being in position to play this role, we still need to work on improving some aspects:**

- to significantly improve the coordination with related communities ARIE (LEAPS, LENS, RADIATE, EMFL, ...); ESCAPE, ECFA-NuPECC-ApPEC , JENAS, ...
- to advance on a full internal coordination of our activities (to improve some of them: E&T strategy, RI/TI aspects, ..., in coordination with ongoing projects and initiatives)

# Thank you very much

