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

IFAST INNOVATION FUND

Result of projects selection

5.12.2022 - Geneva,

Marcello Losasso / CERN

iFAST

IFF: outlook of 2 round of evaluations

- Call for proposal carried out according plan
- At the deadline for submission 18 (good) projects were presented
- 3 projects were asked clarifications about budget
- 17 projects evaluated (1 was not eligible)
- 10 evaluators worked assessing projects; 1 evaluator declined assessment of 2 projects for reason of perceived Conflict of Interests
- All projects were scored and ranked
- First 10 projects were invited to CERN to present their proposals, in 2nd round of evaluation
- 8 projects were eventually selected and will be proposed for funding to GB
- projects can start beginning 2023 - End of projects -> End of IFAST – 1M

Timeline	
Deadline for 1st submission	September 15, 2022
Deadline for 1st round of evaluation	October 17, 2022
Deadline for 2nd round of evaluation	November 30, 2022
Start of the project	January 2023

IIF – EvB

- Careful, timely and expert work of an engaged Evaluation Committee:

C. Antonie, CEA
G.Bisoffi, INFN
M.Baylac, CNRS
A. Faus Golfe, IAB chair
P.Fork, GSI,
R.Geometrante, Kyma SpA
Z.Melhem, Oxford Quantum Solutions Ltd
M.Losasso, CERN, EvB chair,
M.Morandin, INFN, coordinator
M.Vretenar, CERN, ex-officio

C.Welsh also appointed but due to travels schedules, not in condition to participate to the work

what was assessed

Background and aim	Tell Evaluators about your invention/ aim of project
Technical overview	highlights the value of the proposed solution
Work Plan and risk analysis	Team / organization - WP and responsibilities among partners schedule of the project, risk analysis
Applications and impact	potential applications/ uses and sustainibility/environmental
Business plan	scalability, manufacturability, business and revenue models
The commercialization	what is next for your technology
Resources and budget	Team/ resources /industries dedicated to the project

1st round of evaluation: projects assessed

num	Project title	requested budget
#1	Superconducting opposite-field septum magnet prototype	152.5
#2	High-Temperature High-Gradient Superconductors (â€œHIGHESTâ€	160
#3	Permanent magnet solenoid for High efficiency Klystron	115 .0
#4	Development of highly efficient megawatt class cross field vacuum tube amplifier for particle accelerators driven by a solid-state power amplifier at 750 MHz	200 KE
#5	inBEST	129
#6	BASE3	200
#7	MAGNETRONS	150
#8	KAIO-Accelerator	200
#9	High-quality Electron Accelerator driven by a Reliable Laser for Industrial uses (EARLI)	200
#10	Demonstration of additive manufacturing for large and complex shaped vacuum chambers by Plasma Metal Deposition (PMDÂ®)	100
#11	AM applications of refractory metals for ION Sources	100
#12	Millisecond flash lamp treatment for SRF accelerating cavities	160
#13	UTMOST CLEEN Atmosphere: Ultra-Thin Membrane Overlay STacks to Channel Low Energy ElectroNs to Atmosphere	not indicated / missing slide resource and budget
#14	A Field Emission Cathode for a Travelling-Wave RF gun for High Brightness beams in Industrial and Small Research Facility Settings	200
#15	Software Defined Radio based custom signal analysis and generation tool	200
#16	Graphenic foil stripper for high intensity particle beams	150-
#17	Electron guns for societal applications exploiting opportunities offered by additive manufacturing	200

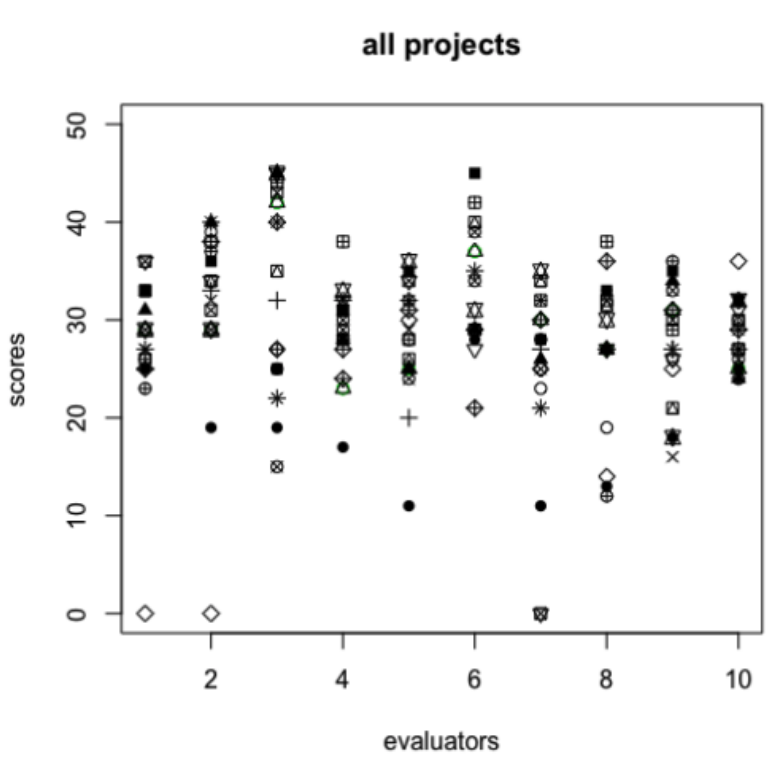
1st round of evaluation: projects scored

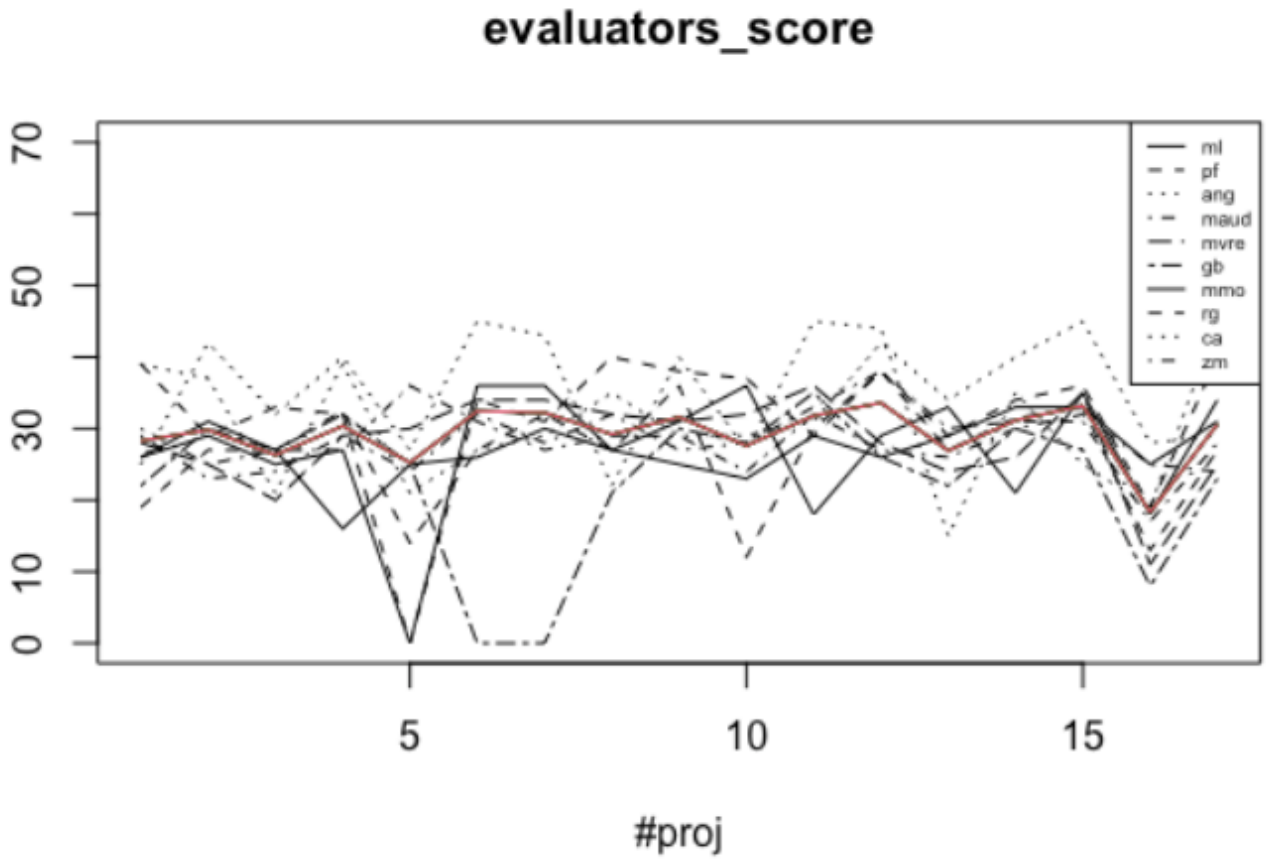
score	Project #	Project title
1	#3	Permanent magnet solenoid for High efficiency Klystron
2	#4	Development of highly efficient megawatt class cross field vacuum tube amplifier for particle accelerators driven by a solid-state power amplifier at 750 MHz
3	#6	BASE3
4	#8	KAIO-Accelerator
5	#2	High-Temperature High-Gradient Superconductors (HIGHEST)
6	#14	A Field Emission Cathode for a Travelling-Wave RF gun for High Brightness beams in Industrial and Small Research Facility Settings
7	#12	Millisecond flash lamp treatment for SRF accelerating cavities
8	#11	AM applications of refractory metals for ION Sources
9	#10	Demonstration of additive manufacturing for large and complex shaped vacuum chambers by Plasma Metal Deposition (PMDÂ®)
10	#16	Graphenic foil stripper for high intensity particle beams
11	#1	Superconducting opposite-field septum magnet prototype
12	#5	inBEST
13	#7	MAGNETRONS
14	#9	High-quality Electron Accelerator driven by a Reliable Laser for Industrial uses (EARLI)
15	#13	UTMOST CLEEN Atmosphere: Ultra-Thin Membrane Overlay STacks to Channel Low Energy ElectroNs to Atmosphere
16	#15	Software Defined Radio based custom signal analysis and generation tool
17	#17	Electron guns for societal applications exploiting opportunities offered by additive manufacturing

2nd round of evaluation: projects selected

project score	project #	project title
AVG w/o min,max		
33.3	12	Permanent magnet solenoid for High efficiency Klystron
32.8	15	Development of highly efficient megawatt class cross field vacuum tube amplifier for particle accelerators driven by a solid-state power amplifier at 750 MHz
31.4	9	KAIO-Accelerator
31.3	14	High-Temperature High-Gradient Superconductors (HIGHEST)
30.9	4	A Field Emission Cathode for a Travelling-Wave RF gun for High Brightness beams in Industrial and Small Research Facility Settings
30.9	6	Millisecond flash lamp treatment for SRF accelerating cavities
30.9	7	AM applications of refractory metals for ION Sources
29.8	17	Demonstration of additive manufacturing for large and complex shaped vacuum chambers by Plasma Metal Deposition (PMDA)

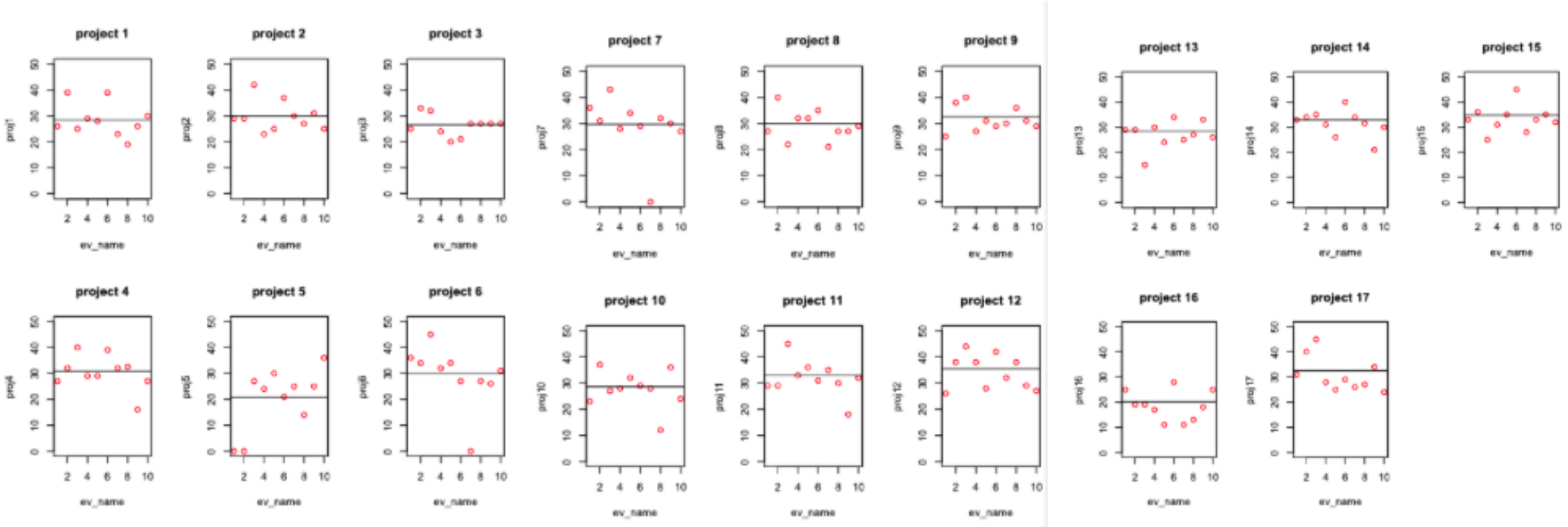
IIF – consistent evaluation – reasonable spread





Projects independently scored, scores averaged, averages "trimmed". The differences reflect individual considerations of the assessments – *but there are no large or unreasonable divergences*

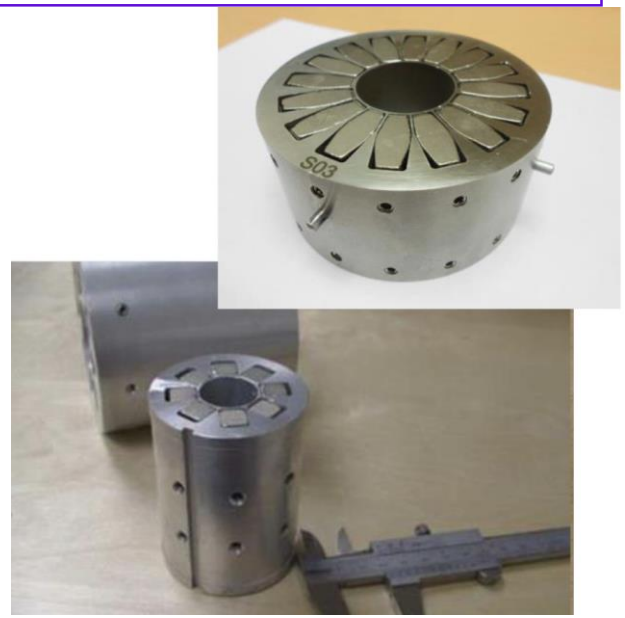
IIF – 2st round of evaluation



IIF – projects selected

Permanent magnet solenoid for High efficiency Klystron

Aim is: to design and build a permanent magnet solenoid for an available klystron. By increasing efficiency of the klystrons, it promises to reduce the operational costs of any accelerator together with the associated carbon footprint.

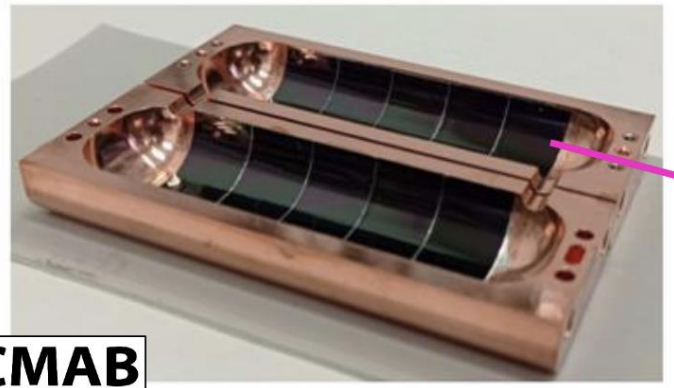


Name	Institute	kEUR Budget beneficiary	kEUR Budget partner	Total
PM for klystron	CERN	15		115
	ELYTT	100		
HIGHEST	CERN	10		160
	CSIC		50	
	Ceraco		100	
FE cathode	PSI	*100*		200
	VDL	*100*		
KAIO	CNRS	180		200
	CNR	20		
SSPA driven CFA	UU	200		200
msec flash	INFN	40		160
	HZDR		110	
	Piccoli	10		
AM for ion source	INFN	75		100
	CERN	25		
AM vacuum chambers	RHP	75		100
	SBI		25	
TOTALS		**950**	**285**	**1235**

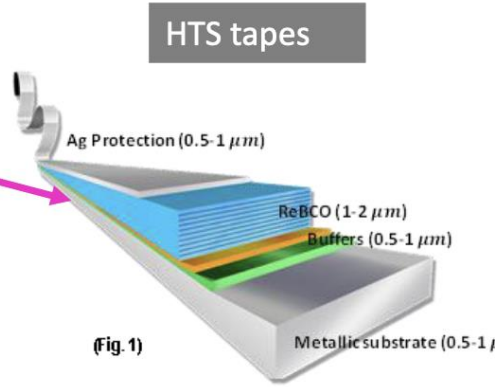
IIF – projects selected

High-Temperature High-Gradient Superconductors

Aim is: to to develop and optimize a 3D coating technology and demonstrate its scalability to make practical RF high power devices. It promises an improvement in Q factor resulting in relevant energy savings for accelerators



RADES cavity



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SSPA driven CFA	UU	200		200
msec flash	INFN	40		160
	HZDR		110	
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	CERN	25		
AM vacuum chambers	RHP	75		100
	SBI		25	
TOTALS		**950**	**285**	**1235**

IIF – projects selected

Field Emission Cathode for a Travelling-Wave RF gun for High Brightness Beams

•Aim is: to develop a versatile high brightness MeV electron source based on a field emission cathode. The field emission gun's overall footprint is expected smaller than compared to RF photogun and DC thermoionic gun. Consequently, it will have a reduced environmental impact.

Name	Institute	kEUR Budget beneficiary	kEUR Budget partner	Total
PM for klystron	CERN	15		115
	ELYTT	100		
HIGHEST	CERN	10		160
	CSIC		50	
	Ceraco		100	
FE cathode	PSI	*100*		200
	VDL	*100*		
KAIO	CNRS	180		200
	CNR	20		
SSPA driven CFA	UU	200		200
msec flash	INFN	40		160
	HZDR		110	
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AM for ion source	INFN	75		100
	CERN	25		
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	SBI		25	
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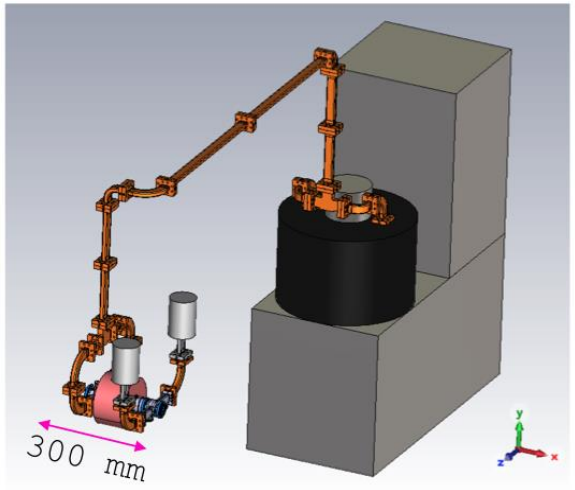
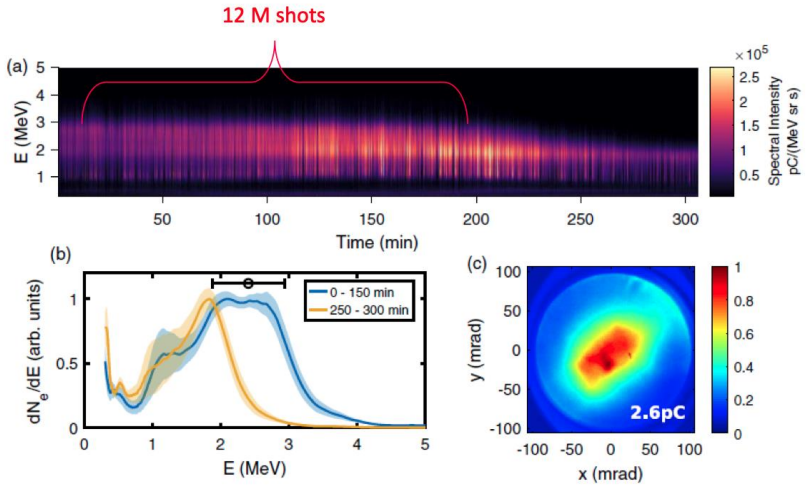


A mockup of the travelling-wave gun with the klystron-modulator source.

IIF – projects selected



KAIO Accelerator

•Aim is: to industrially develop a cost- efficient and stable high power laser technology in kHz class, apt to be used in radiobiology and NTD applications. It promises to reduce energy requirements for LPA.

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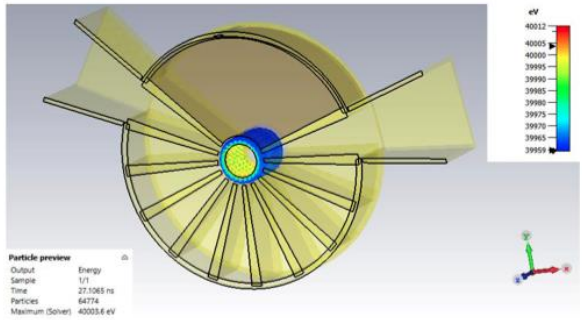
IIF – projects selected

Preliminary results on CFA design:



Development of Highly Efficient MW Class Cross Field Vacuum Tube Amplifier for Particle Accelerators Driven by a Solid State Power Amplifier at 750 MHz

•Aim is: to develop a megawatt class cross-field amplifier (CFA) based RF system for particle accelerator applications. I
It promises the realization of a CFA with peak RF power of 1 MW at 750 MHz with Efficiency >80%, Gain ~30dB, Duty cycle 0.1 % and PRF 1 kHz

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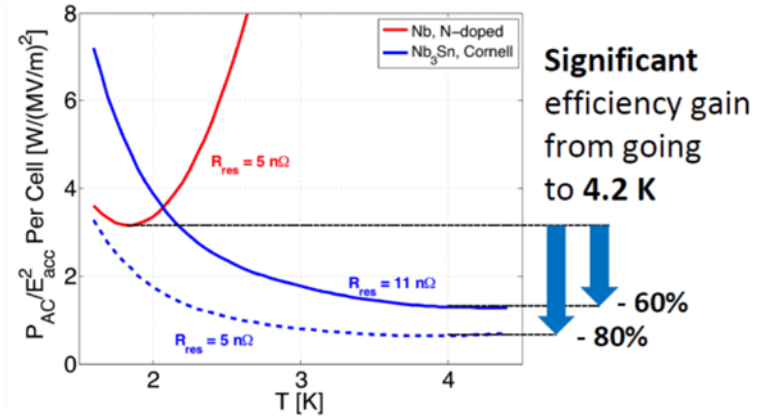
IIF – projects selected



Millisecond flash lamp treatment for SRF accelerating

Aim is: Develop a novel thermal process to improve performances of SC coating by suppressing (reducing) Cu substrate heating. SC resonant cavities operating at higher T than bulk Nb promise to reducing cryogenic power costs by 60%. In addition, FLA is less energy-intensive (20-30) resulting in a reduction of CO2 emissions

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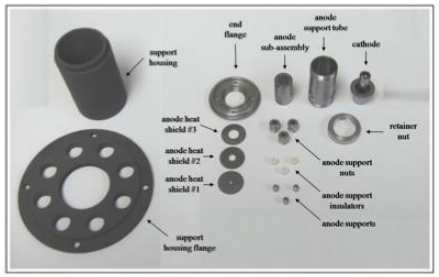
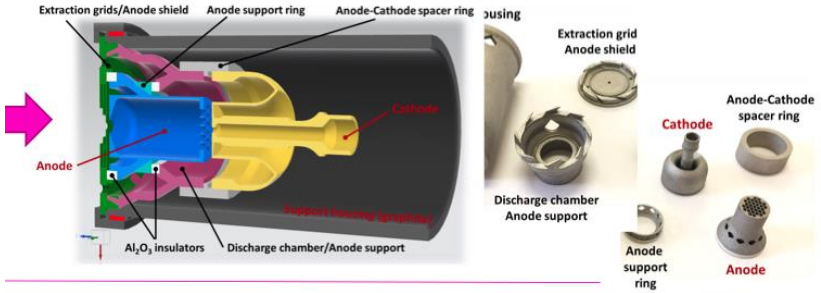
IIF – projects selected





AM applications of refractory metals for ION Source cavities

Aim is : Development of new Refractory Metals Alloys specifically Designed for Additive Manufacturing to improve the physical performance of the ion sources (Ta-based and/or Nb-based alloys) or to solve the fabrication defects related to pure metals production. It promises to reduce amount of wasted material and increase process efficiency

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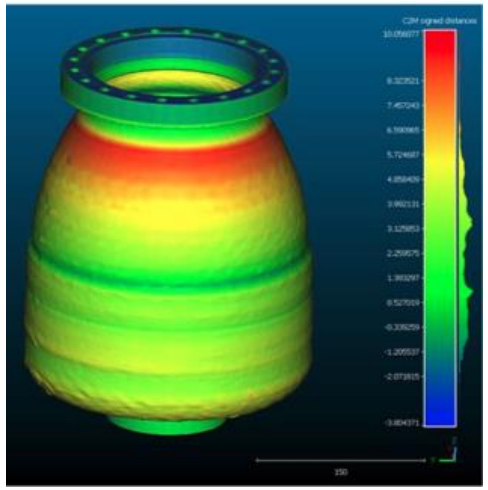
IIF – projects selected



Demonstration of additive manufacturing for large and complex shaped vacuum chambers by Plasma Metal Deposition (PMD®)

Aim is : to demonstrate the Plasma Metal Deposition (PMD) as AM of a large and complex vacuum chamber geometry. It promises a positive impact on the environmental footprint by reduction of material waste by 30 % and more, reduction of integration steps , reduction of stock material, reduction of lead time

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AM for ion source	INFN	75		100
	CERN	25		
AM vacuum chambers	RHP	75		100
	SBI		25	
TOTALS		**950**	**285**	**1235**

IIF – payments and monitoring

- Projects selected: 13 IFAST beneficiaries (no issues for payments to these) and 4 new entities.
- New entities required to become partners, to sign GA
- 2 batches of payments : 1st interim payment in January 2023 (50%)
- 2nd final payment → at the end of the project/ last deliverable
- Projects do not have exactly same duration.
- Monitoring: I.FAST AM in April too early for projects presentation. Projects report could be at special session of mid-term project review → Nov/Dec 2023
- *I reserve the possibility to meet / inspect the projects during implementation*

What now:

- GB in December will be asked to award the funding to these projects

- internal discussion in CERN and with EC PO has been carried-out concerning the implementation of payments to selected projects.

- There will be no need for Amendment of GA.

- The 4 new entities becoming “partner organisations”

- Partners will be funded by the CERN contribution and some subcontracting from beneficiaries

- The 8 funded projects shall need to be described in the Periodic Report

Q &A

Thank you


iFAST
I.FAST Internal Innovation Fund
Innovation
The fund will contribute to advancing the status-of-art of I.FAST thematic areas.
Sustainability
The fund shall contribute to improving the sustainability of accelerator technologies.
Funding
The fund will finance projects, each receiving a contribution between 100 and 200 kEUR.
About the fund
The I.FAST Internal Innovation Fund (IIF) aims at stimulating the innovation potential of accelerator technologies. The primary objective of the fund is to encourage I.FAST beneficiaries to identify innovative solutions with viable industrial or commercial potential. This fast-track, competitive process will finance emerging technologies, processes, research, business models and other innovative solutions, at both development and prototype stages. Apply by September 15, 2022.
Apply by September 15, 2022
More information: ifast-project.eu/iif
This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No 101004730.