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# WP4: managing innovation and new materials

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iFAST



# WP4 objectives & goals: transversal actions in I.FAST

## **Promote innovative initiatives in the I.FAST community**

Set up and manage the Innovation Fund to support new proposals in the second phase of the project

→ Based on acquired experience from ARIES and from the 1<sup>st</sup> phase of projects in I.FAST

Looking for intersections of I.FAST thematic areas and EC priority agenda, contributing in tackling similar priorities of enlarged communities

→ To connect accelerator community and society at large

Distribute and protect generated IP with particular attention to those WPs where industrial companies are involved.

# WP4 objectives & goals: transversal actions in I.FAST

## **Develop and industrialize new materials**

Investigate graphene and others advanced materials for accelerators beam windows.

→ *Nuclear sector, ADS, future accelerators*

Industrialize carbide-carbon based materials for accelerators components and for industrial applications - Starting from the status-of-art, investigating optimized industrial processes and alternative materials to MoGr

→ *fusion, aerospace, automotive*

## WP4 participants

<b>Participant</b>	<b>Person months per participant (EC+ in-kind)</b>	<b>Participant</b>	<b>Person months per participant (EC+ in-kind)</b>
<b>1. CERN</b>	0.8 + 23.2	<b>25. INFN</b>	0 + 2
<b>3. RHP</b>	5.2 + 0	<b>38. NNK</b>	24 + 0
<b>7. CNRS</b>	2 + 0	<b>44. HUD</b>	1 + 0
<b>14. GSI</b>	0.9 + 9.1	<b>20. WWU</b>	10 + 15

The man-power for WP4 is estimated at 93.2 PMs

EC contribution amounts to 1,400 k€ (14% of the total EC funding)

320 k€ in WP4 will be dedicated to the study of new materials and for

# WP4 Deliverables & Milestones

**D4.1:** Evaluation criteria for IIF projects, and Evaluation Body.  
*Define, agree and approve the system for implementing the IIF.*

M20

→ **M12**

**D4.2:** IIF Projects awarding.  
*Define the projects that will be funded.*

M24

**D4.3:** Beam-windows prototypes.  
*Manufacture and test of 2 beam-windows prototypes.*

M32

**D4.4:** Production of large-size CCM plates.  
*Produce two large CCM plates (cross section >400 cm<sup>2</sup>) in a single sintering cycle.*

M24

WP4 Managing Innovation, new Materials							
4,1	Innovation Management and Committee					D	
4,2	Management of the Innovation Fund						D
4,3	Innovative beam windows for high-power accelerator applications						M
4,4	Large scale Carbide-Carbon Materials for multipurpose applications					M	

**Could the IIF budget be reviewed rolling over the unspent ARIES budget?**

## WP4 milestones

M4.1: I-FAST meets industry event 1	CERN	12	Organize in CERN event 1 gathering industries and academia on thematic topic
M4.2: I-FAST meets industry event 2	HUD	24	Organize in HUD event 2 gathering industries and academia on thematic topic

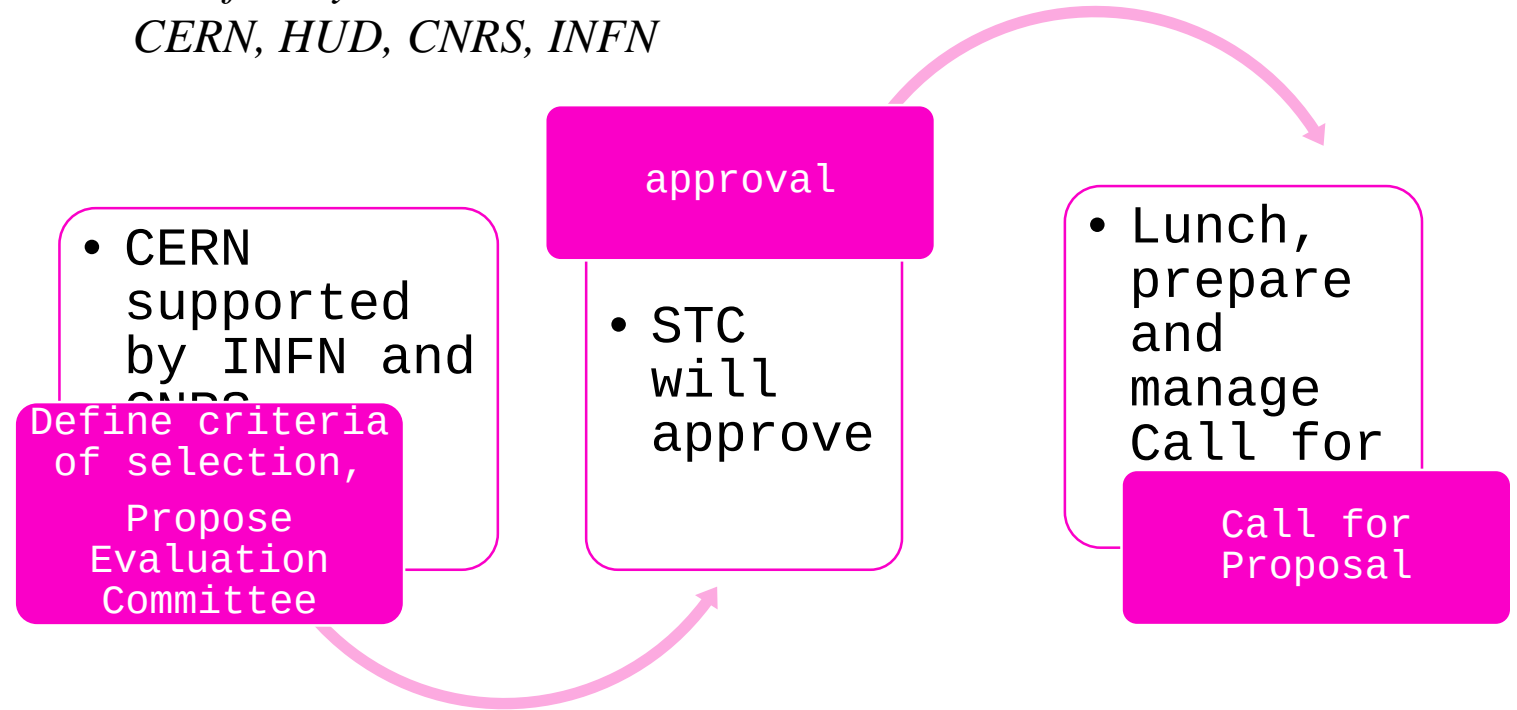
MS13	GSI	16	First characterisation of beam windows materials under thermomechanical load and extended radiation damage
MS14	CERN	12	Evaluation of a CCM alternative to Molybdenum-Graphite

# Task 4.1. Innovation Management and Committee

TL: M.Losasso

- Propose innovations to develop within I-FAST
- Define criteria for evaluation of projects for IIF
- Propose for appointment an evaluation body for IIF
- Prepare the CFP for IIF
- Run thematic events

*Beneficiary:  
CERN, HUD, CNRS, INFN*



**D4.1:** Evaluation criteria for IIF projects, and Evaluation Body.  
*Define, agree and approve the system for implementing the IIF.*

## WP4 Internal Innovation Fund

WP4 will manage an additional Call for Pr

CfP will be an **INTERNAL** initiative to I.FAST

It will be directed towards the 9 thematic I.FAST areas

Process will start at end of Y1

It will finance innovative projects, between 5 and 10

Directed to developments and/or prototypes, contributing up to 200 K€

The IIF budget is equivalent to 10% of the project total requested EC



## WP4 IIF

lesson learned from Proof-of-concept of ARIES:

A Internal Funding programme can act as a seed able to collect, around a viable and innovative idea, different actors mobilising financial and technical resources more substantial than the seed fund itself.

→ **We expect the same from I.FAST IIF !**

# Task 4.2. Management of IIF. TL:

M.Losasso

***Beneficiary:***  
***CERN, CNRS, INFN***

Implement the  
Internal  
Innovation  
Fund

Set timetable and manage the process

Monitor  
progress of  
work

Monitor supported projects. Agree with the running projects a proper schedule of monitoring

Execute the  
payments of  
the project  
according to  
the agreed  
work-plans

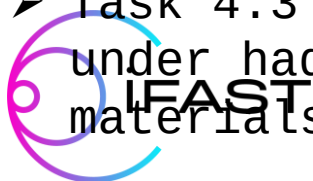
Link payment(s) and deliverable schedule(s)

**D4.2:** IIF Projects awarding.  
*Define the projects that will be funded.*

# Task 4.3 - GRAPH&BEAWIN - Materials for beam-window applications. TLs: M.Tomut & M.Losasso

**Beneficiary:**  
**CERN, GSI, RHP,**  
**WWU**

- The increasing powers of the next-generation accelerators require new designs of beam windows
- Beam windows are key components in high-intensity hadron beam applications
- Used to separate the beam tube from the atmosphere or to contain gas targets within the beamlines.
- Special requirement on materials (low atomic number) and thermomechanical properties
- Graphenic membranes are excellent replacement for traditionally used window materials such as steel, beryllium, aluminum or Inconel alloys.
- Task 4.3 proposes to develop together with RHP industrial partner and to test under hadron beams and pressure suspended **graphenic membranes** and also other materials for this specific application



# Task 4.3 - GRAPH&BEAWIN - Materials for beam-window applications.

**Beneficiary:**  
**CERN, GSI, RHP,**  
**WWU**

WP4 task3 will design, manufacture and test new materials for this vital component.

Challenges are to improve lifetime of BW, while considering heavy-ion beam-induced damage, pre-stress, radiation damage, fatigue, decay heat prediction....

Design materials and processes  
Simulate thermal, structural, fatigue, stress waves, decay heat

Optimize Graphene produced sheets

Tests beam-induced structural changes of the

## Task 4.4 Large scale Carbide-Carbon Materials for multipurpose applications – TL: F.Carra

- Company NNK will put in place a system to allow producing two plates per machine cycle of minimum cross-section  $400 \text{ cm}^2$  and minimum thickness 3 cm. This increased sintering capacity will result in a cost reduction.
- Company IFAM will investigate CCM alternative to MoGr, requiring lower sintering temperatures, and produce single plates per machine cycle with a volume up to  $1800 \text{ cm}^3$ . The decreasing of the sintering temperature will result in a cost reduction. Also, the material volume reached will meet the targets of the task.

# Task 4.4 Large scale Carbide-Carbon Materials for multipurpose applications

*Beneficiary:*

*CERN, NANOKER, IFAM*

to promote an extensive use of CCM in HEP and in the industry, this Task aims to improve status-of-art of material production

increase the maximum achievable part size and reduce the production costs of CCM

improving maximum volume by a factor of 3

Reduce cost by factor of 2

**D4.4:** Production of large-size CCM plates.

*Produce two large CCM plates (cross section >400 cm<sup>2</sup>) in a single sintering cycle, M24*

## Next steps

Wednesday, May 5, 15h30  
KoM of WP4:

- To meet first time all of us
- To discuss budget, plan of activities in different tasks
- To discuss status of few activities already started (production of materials and beam-test)
- To review schedules of Milestones and Deliverables



## Discussion with I.F.A.S.T. manag

- Discuss in STC the IIF setting-up and definition
- Prepare proposal for STC approval of Ev Committee
- Define Budget and time plan of IIF

# Conclusion

WP4 is ready to deliver and to contribute to the success of I.FAST

Soon will be discussed with the running projects a schedule of monitoring

Few activities already started

Focus of Internal Innovation Fund shall be to match I.FAST thematic areas and the EC priority agenda, contributing in tackling similar requirements of enlarged communities

WP4 strives to fostering dependent complementarities and engaging with industries





# Background slides

# Task 4.3 – budget.

Beneficiary short name	Person-months	Travel	Equipment and consumables	Other direct costs	Material direct costs	Total direct costs	EC requested funding (without overheads)	EC requested funding (including overheads)
CERN	5.0	7'000.			7'000.	60'000.	40'000.	50'000.
GSI	10.0	6'000.	20'000.	4'000	30'000	90'000	36'000.	45'000.
WWU	25.0	4'000.	4'000.	2'000	10'000	110'000	44'000.	55'000.
RHP	5.0	2'000.	56'000.		58'000	78'000	40'000.	50'000.
Total	75.0	19'000.	80'000.	6'000	105'000	415'000	160'000	200'000



# Task 4.4 - budget

Beneficiary short name	Person-months	Travel	Equipment and consumables	Other direct costs	Material direct costs	Total direct costs	Total indirect costs	Total costs (direct + indirect)	EC requested funding
CERN	3.0	16'000.	20'000.	10'000	46'000	70'000	17'500	87'500.	35'000.
Nanoker	6.0	3'000.	55'000.		58'000	79'000	19'750	98'750.	50'000.
IFAM	2.5	5'000.	27'000.		32'000	55'500	13'875	69'375.	35'000.
Total	11.5	24'000.	102'000.	10'000	136'000	204'500	51'125	255'625	120'000

