

I-FAST

Innovation Fostering Accelerators Science
and Technology
(ex-ARIES2 / FIAST)

WP8 – ISM

Innovative Superconducting Magnets

Meeting between partners for application preparation

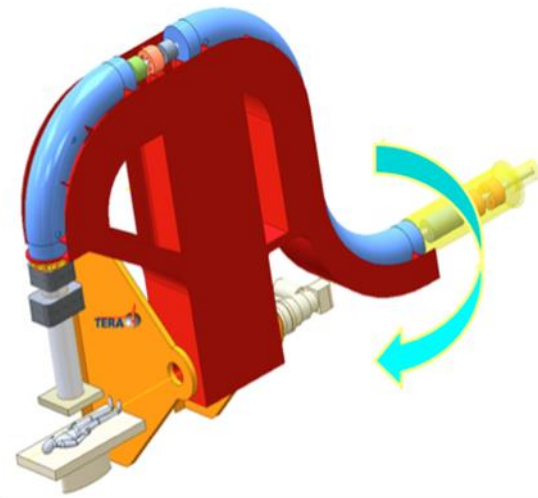
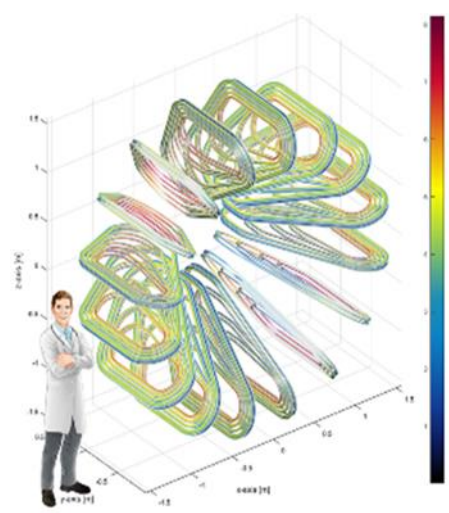
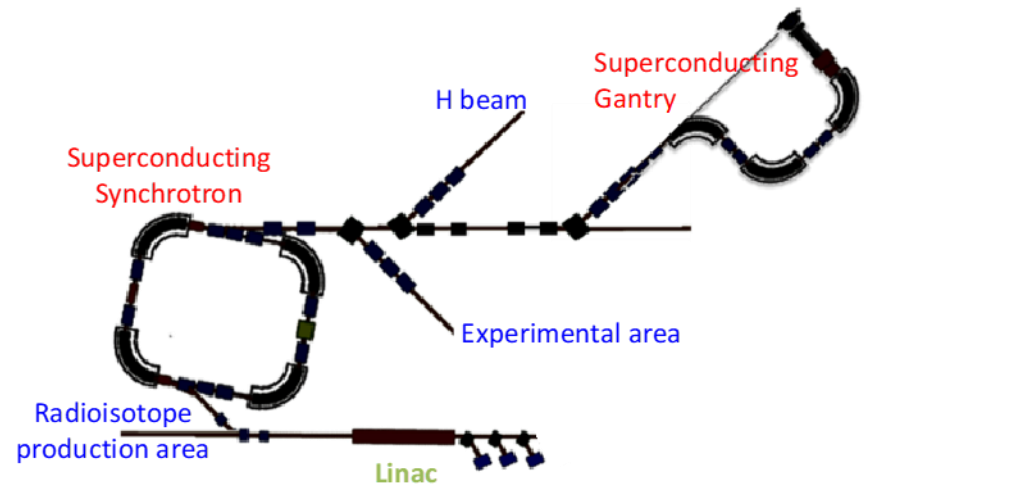
CERN- 22 January 2020

Convener: Lucio Rossi – INFN-Milano

Content

- The «associate» Design Study HITRI
- Pre-application of summer 2019
- Score
- Work description WP8
- Budget WP8
- Addition
 - Strategy Group for EU-HTS with permanent WAM-HTS
 - Task Initiative on fast ramping SC cable (CORT) led by GSI (P. Spiller)

HITRI



HITRI – WP4 on Magnet Design

WP number	4			Lead beneficiary			INFN	
WP title	Magnet design							
Partner no.	1	2	7	10	11	12	13	14
Partner	CERN	SEEIIST (SEN)	INFN	PSI	<u>CEA</u>	CIEMAT	UU	WRPC
PM per partner	5.5 (+4.5)	2.5 (+5.5)	5 (+32)	1 (+1)	10 (+10)	13 (+9)	4 (+4)	7.5 (+4.5)
Start month	M1				End month			M35
Objectives								
<p>The objective of WP4 is to perform a first technical and financial assessment of several magnet designs for the novel HITRI synchrotron and gantry. This includes a preliminary engineering design for the HITRI accelerator magnets (mainly dipoles) and HITRI gantry magnet. The WP will also construct a small size demonstrator magnet that will give important data useful for accelerator as well as a gantry magnets.</p>								

Deliverables

- D4.1: Report on assessment of existing accelerator magnet types, suitable for fast SC synchrotron and for SC gantry and preliminary evaluation (M20)
- D4.2: Final report on Magnet design for SC synchrotron and SC gantry, with indication of time, cost and technology readiness assessment (M34)
- D4.3: Demonstrator Readiness Report (M35)

Application: Nov.2019: answer : spring 2020
 If approved start around September 2020.

HITRI – WP4 Magnets – Budget

Beneficiary short name	Person-months	Monthly personnel cost	Personnel costs	Travel	Equipment and consumables	Other direct costs	Sub-contracting	Material direct costs	Total direct costs	Total indirect costs	Total costs (direct + indirect)	EC requested funding	Co-funding/ matching funds
CEA	20.0		122,000.00	12,000.00	20,000.00	0.00	0.00	32,000.00	154,000.00	38,500.00	192,500.00	86,625.00	105,875.00
CERN	10.0		89,000.00	7,000.00	30,000.00	0.00	0.00	37,000.00	126,000.00	31,500.00	157,500.00	65,812.50	91,687.50
CIEMAT	22.0		77,000.00	14,000.00	25,000.00	0.00	0.00	39,000.00	116,000.00	29,000.00	145,000.00	65,250.00	79,750.00
INFN	37.0		155,400.00	29,000.00	65,000.00	0.00	45,000.00	139,000.00	294,400.00	62,350.00	356,750.00	160,537.50	196,212.50
PSI	2.0		20,800.00	3,000.00	0.00	0.00	0.00	3,000.00	23,800.00	5,950.00	29,750.00	13,387.50	16,362.50
UU	8.0		52,800.00	11,000.00	0.00	0.00	0.00	11,000.00	63,800.00	15,950.00	79,750.00	35,887.50	43,862.50
WRCP	12.0		20,400.00	4,000.00	2,000.00	5,000.00	0.00	11,000.00	31,400.00	7,850.00	39,250.00	17,662.50	21,587.50
SEEIIST	8.0		36,000.00	10,500.00	6,000.00	0.00	0.00	16,500.00	52,500.00	13,125.00	65,625.00	15,093.75	50,531.25
Total	119.0		573,400.00	90,500.00	148,000.00	5,000.00	45,000.00	288,500.00	861,900.00	204,225.00	1,066,125.00	460,256.25	605,868.75

ARIES2 – Innovation Pilot Projects

- Call for proposal in early summer 2019: deadline pre-applications to TIARA/ARIES selection committee 31 Aug'19. Plafond 500 kE EU-funds
- Meeting with Labs on 7 July 2019 (HITRI and ARIES2)
- Meeting with industry and labs on 17 July
 - Program on CCT (scope: synchrotrons and gantry): 830 kE
 - 3 smal prot: 1 curved multipole LTS – 1 fast ramping – 1 HTS (if possible also MgB₂)
 - Program on Toroid (Scope: gantry and astro-particle magnets): 560 kE
- December 2019: **CCT accepted** with 600 kE, increased later to **650 kE**
- 19 December 2019 meeting between Labs: Ok, increase a litle bit matching funds ratio wrt initial proposal and dropping one proto, ~~i.e the fast ramping~~
- This meeting is critical since we need to form the budget and main objectives & deliverables by 1 week!

The new Innovation Pilot Project

The Horizon2020 call «**INFRAINNOV-04-2020: Innovation pilots**» 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:**
- Call opened **28 November 2019**
 - Deadline for submission **17 March 2020**
 - Result of EC evaluation <17 August 2020
 - Consortium Agreement preparation October 2020 – March 2021
 - Project start **1 May 2021** (at end of ARIES)
 - Duration 4 years (2021 – 2025)

Targeted call. We are not in competition with other communities, but we have to **aim for excellence** because:

1. We need to pass the **minimum evaluation threshold**
2. Our project is a «**pilot**» to demonstrate integration and good organisation of our community. If successful, can open the way to larger «**programs**» in **Horizon Europe**.

Project structure – Work Packages

WP	WP Name	WP Coordinator	Coord. Lab.
1	Coordination, dissemination	M. Vretenar	CERN
2	Training, communication, outreach	P. Burrows	UOXF
3	Industry engagement	M. Morandin	INFN
4	Managing Innovation, new Materials	M. Losasso	CERN
5	New concepts, performance improvements	F. Zimmermann	CERN
6	Novel particle accelerators concepts and technologies	R. Assmann	DESY
7	High brightness synchrotron light sources	<i>R. Bartolini</i>	UOXF
8	Innovative superconducting magnets	L. Rossi	INFN
9	Innovative superconducting cavities	<i>C. Antoine, O. Malyshev</i>	CEA/STFC
10	Advanced accelerator technologies	T. Torims	RTU
11	Sustainable concepts and technologies	M. Seidel	PSI
12	Societal applications	R. Edgecock	HUD
13	Technology Infrastructure	S. Leray	CEA

WP Coordinators are invited to nominate a **Deputy Coordinator** or a **Co-Coordinator** – to share the management we should have **two names per Workpackage**.

Brexit news

Guarantee and extension funding

UK participants may be unable to access funding from the EU after Brexit if the **UK becomes a third country**.

In October., the UK government has committed to provide funding for **all successful eligible UK bids to Horizon 2020 that are submitted before the end of 2020**. This funding will apply for the lifetime of projects.

The funding guarantee and extension to the guarantee will be delivered by UK Research and Innovation (UKRI).

The screenshot shows the GOV.UK website with a search bar at the top. Below the search bar is a banner for 'Register to vote' with a 'Hide message' link. The main content area is titled 'Guidance UK participation in Horizon 2020 after Brexit' and is updated as of 24 October 2019. The page is organized into a 'Contents' section on the left and a main text area on the right. The 'Contents' section includes links for 'Stay up to date', 'Funding overview', 'Current UK participants', 'UK applicants who submit new bids before Brexit', 'Applying to Horizon 2020 after Brexit', 'Ongoing projects that may become ineligible after Brexit', and 'Delivery of government funding'. The 'Stay up to date' section contains a message about the UK leaving the EU and a link to sign up for email alerts. The main text area discusses the UK's ability to participate in Horizon 2020 as a non-EU country and lists types of projects that cannot be accessed.

GOV.UK

Search

[Register to vote](#) [Hide message](#)

Register by 26 November to vote in the General Election on 12 December.

Home > [UK participation in Horizon 2020: UK government overview](#)

Department for Business, Energy & Industrial Strategy

Innovate UK

UK Research and Innovation

Guidance

UK participation in Horizon 2020 after Brexit

Updated 24 October 2019

Contents

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- [Funding overview](#)
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Stay up to date

The UK is leaving the EU. This page tells you how to prepare for Brexit and will be updated if anything changes.

[Sign up for email alerts](#) to get the latest information.

The UK should be able to participate in Horizon 2020 as a non-EU country (a [third country](#) if we leave the EU without a deal).

Third countries can bid to, participate in and lead the majority of Horizon 2020 projects, but cannot access:

- mono-beneficiary schemes
- some space and security projects which only allow participants from EU countries
- some multi-beneficiary schemes (for example Fast Track to Innovation (FTI))

Slide by M. Vretenar - CERN
I-FAST Project Coordinator

Matching funds

For R&D activities (WPs 4-13)

- Total **EC contribution 7.67 M€**.
- Project cost announced by participants **15.73 M€** w/o overheads, 19.7 M€ with 25% overheads.
- Funding rate: **39%** (ratio EC contribution / Total cost with overheads)
- Assuming 50% matching funds for WP1-4, this leads to a total project cost of about **25 M€ (funding rate 40%)**.
- Very good, we can even reduce if required the matching funds in some activities.

The main problem: number of beneficiaries

- The ideal number of EC beneficiaries (partners receiving a direct EC contribution) for these projects is **about 40**.
- Too many beneficiaries means excessive **administrative work** (for CERN and for the WPs), high **administrative overheads** for partners receiving only a small contribution, and more **risks** for the project of delays or defaulting partners – and for the same reasons it is not appreciated by the EC offices!
- Adding all the institutes that you have indicated as partners in your activities **we come to 60 Beneficiaries**.
- **This is far too many!** We can agree on maximum **50 beneficiaries** (better less) but we cannot exceed this limit.

Slide by M. Vretenar - CERN
I-FAST Project Coordinator

Solution: associated partners

- The solution is to move some of the small partners to become “**associated partners**” via a larger partner (leading beneficiary).
- Associated partners will sign the **Consortium Agreement** and participate in the **Governing Board** meetings (with the same voting rights as Beneficiaries) but they don’t sign the **Grant Agreement** with the EC.
- Associated partners sign an Agreement with their partner (usually a large laboratory) that engages to give them their budget in exchange of a given contribution.
- The associated partner budget is added to the EC contribution of the leading partner but it is **not an eligible expenditure**: has to be covered by the **matching funds and/or overheads** of the leading partner.
- Consequence is that associated budget must be “small” and that the leading beneficiary must be a large laboratory as CERN, GSI, CEA, etc.
- Note that **travels are eligible**: travels of an associated partner can be covered by the leading partner.

You have to take this into account when you produce your budget table

My point of view

- We need to agree in broad terms.
- It is useless to go too much in details with budget since we do not know if we are approved (but we have very good chance).
- Small reallocation (within 20%) is always possible, if justified.
- Even higher but need to be duly proved.
- Try to avoid subcontracting (EU does not give overheads)
- We will be prudent with deliverable. However we need to manufacture **TWO PROTOs** at least.
- Labs **MUST** provide the design and take responsibility for it!
 - Labs must provide also Superconductors, qualify it, and cold test the magnets and MM.
 - MgB₂ provided by ASG (Columbus)
- Industry **MUST** produce a light set of engineering drawings and **manufacture!**

Program: demo 1

- One CCT about 1 m long max CURVED. Inner diameter: about 60 mm
- Possibly with dipoles and quads components.
- Former might be difficult to machine. At least 2 former with grooves (a final tube to cover all).
- Tested at least in LHe 4.2 K but designed also to operate in cryocooled mode up to 5-6 K.
- SC : LTS (probably suitable Nb-Ti, cheap Nb₃Sn possible). However we will consider MgB₂ if it might become a viable alternative this may open the way to **10 K operation!!**

Program: demo 2

- One CCT in HTS (most probably REBCO); 0.5-1m, straight, 60 mm inner dia.
- Tapes vs CORC...
- Controlled insulation (Metal-as-Insulator --> CEA)
- Does it work for «precise» magnets?
- Insulation is always a possibility but protection become more difficult
- **Test 80-4.2 K; Operation at 10-20 K.**
- Maybe we need to manufacture single layers... and test in different configurations... Here we look for technology rather than Field Quality.
- Maybe one layer curved?

Industry

- Involving Industry in this project is one of the scope
- Ideally each industry would like to have its own work.
- Unless we miraculously can manufacture 4 complete protos, we need to form couples of Industry to work together (a CCT has TWO layers, each with its own former, that needs to fit. And it needs somebody that assemble the whole.
- We will try to keep anyway clear what are the responsibilities of one company from the ones of the other company.
- The alternative is that we do not embark only TWO companies that offers more matching funds. I would not like this type of competition...

Task 8.1: WP8 Coordination and Strategy Group (from M1 to M48)

- Partners: INFN, CERN, CEA/PSI? GSI?
- Coordinate the work-package activities, especially between CCT design and the fast cycling activity.
- Maintain a close liaison with other possible EC-funded projects having synergies with this WP, namely H2020-Design Study HITRI, and make an inventory of possible future accelerator project that may need HTS, like FCC, FAIR upgrade, CERN fixed targets beamlines, etc...
- Form a permanent European Strategy Group, open to partner from all world, to discuss the European strategy for HTS magnets for accelerators, to improve involvements of Industry in such technology; organise two or more events with Laboratories and Industry to foster common development of HTS magnets for accelerators.
- Take care of the WP schedule and organise reviews of the works of the task and editing the MS and DLV reports.

Task 8.2 : Conceptual and Preliminary Engineering design of a CCT scaled demonstrator with new integrated curved coil geometry (for synchrotron and/or gantry) with LTS and /or MgB₂ (from M1 to M34)

- Partners (INFN, CERN, CIEMAT, UU, WRPC, ASG)
- Define a few options for the magnet structure and magnetic design at conceptual level.
- Consider various LTS Nb-Ti, Nb₃Sn and MgB₂ solutions
- Computing of losses in cyclic operational mode for various type of SC.
- Preliminary engineering design of one scaled prototype, with field quality, structure, ends, quench & protection, thermal design
- Prototype production 10 km of MgB₂ of 0.9-1 mm diameter, suitable for of high field (5 T) and small filaments for relatively low losses magnet

Task 8.3 : Conceptual and Preliminary Engineering design of a CCT scaled prototype in HTS for synchrotron and/or gantry (from M1 to M36)

- Partner: CEA, INFN, CERN, PSI, WRPC, UniGE
- Define a few options for the magnet structure and magnetic design at conceptual level with
- Consider various HTS options: REBCO (most likely), Bi-2212, IBS (Iron Based Superconductors), with design of field quality, structure, ends, thermal design
- Computing of losses and temperature increase in cyclic operational mode for various type of SC with and without use of Controlled Insulation (CI) technology, quench & protection
- Preliminary engineering design of one scaled straight prototype

Task 8.4 : Construction of a CCT (or two) scaled prototype(s) with new integrated curved coil geometry (from M10 to M48)

- Partners: BNG, Scanditronix for construction; CERN and UU for test
- Engineering (constructive) design
- Design and construction of coil former and assembly parts
- Winding and magnet assembly (on in LTS and/or in MgB2)

Magnet test and validation

Task 8.5 : Construction of a CCT scaled prototype in HTS (form M12 to M48)

- Partner: Elytt, Sigmaphi for construction; CERN, CEA and INFN for test and support from WRPC
- Engineering (constructive) design
- Design and construction of coil former and assembly parts
- Winding HTS with suitable special controlled insulation (tooling included) and magnet assembly
- Magnet test and validation

Extra to the 650 KE of the CCT program :

Task 8.6 Fast ramp rate HTS cable (CORT type) (GSI and associates)

- XXX
 - XXX
 - Budget probably for 200 kE
-
- **Budget for the WAM-HTS and Strategy Group : 50 kE**

Budget (CCT program with Industry)

Beneficiary short name	Person-months	Monthly personnel cost	Personnel costs	Travel	Equipment and consumables	Other direct costs	Sub-contracting	Material direct costs	Total direct costs	Total indirect costs	Total costs (direct + indirect)	EC requested funding
CEA	10.0	6,100.0	61,000.00	4,000.00				4,000.00	65,000.00	16,250.00	81,250.00	36,562.50
CERN	11.0	8,000.0	88,000.00	4,000.00	50,000.00	20,000.00		74,000.00	162,000.00	40,500.00	202,500.00	91,125.00
CIEMAT	12.0	3,500.0	42,000.00	5,000.00				5,000.00	47,000.00	11,750.00	58,750.00	26,437.50
INFN (MI + GE)	16.0	4,200.0	67,200.00	8,000.00	80,000.00	20,000.00		108,000.00	175,200.00	43,800.00	219,000.00	98,550.00
PSI	6.0	8,000.0	48,000.00	3,000.00				3,000.00	51,000.00	12,750.00	63,750.00	28,687.50
UniGE	6.0	8,000.0	48,000.00	2,000.00	10,000.00			12,000.00	60,000.00	15,000.00	75,000.00	33,750.00
UniUP	5.0	6,600.0	33,000.00	3,000.00	15,000.00	5,000.00		23,000.00	56,000.00	14,000.00	70,000.00	31,500.00
WRCP	20.0	2,000.0	40,000.00	4,000.00	5,000.00			9,000.00	49,000.00	12,250.00	61,250.00	27,562.50
ASG -IT	4.0	8,000.00	32,000.00	2,000.00	45,000.00			47,000.00	79,000.00	19,750.00	98,750.00	34,562.50
BNG- DE	10.0	8,000.00	80,000.00	2,000.00	65,000.00			67,000.00	147,000.00	36,750.00	183,750.00	64,312.50
Elytt - ES	10.0	8,000.00	80,000.00	2,000.00	55,000.00			57,000.00	137,000.00	34,250.00	171,250.00	59,937.50
Scanditronix-SE	10.0	8,000.00	80,000.00	2,000.00	55,000.00			57,000.00	137,000.00	34,250.00	171,250.00	59,937.50
Sigmaphi-FR	10.0	8,000.00	80,000.00	2,000.00	55,000.00			57,000.00	137,000.00	34,250.00	171,250.00	59,937.50
Total	130.0		779,200.00	43,000.00	435,000.00	45,000.00	0.00	523,000.00	1,302,200.00	325,550.00	1,627,750.00	652,862.50

UniGE, WRPC (and maybe ASG) are associated to CERN rather than direct beneficiary. Less bureaucracy, they receive the money FROM CERN ; CIEMAT, PSI, UU receive money also in other WPs so they are direct beneficiaries. All Institute and Industry must have a PIC number from EU: please check immediately!!!!

Target : 650 k€

Next

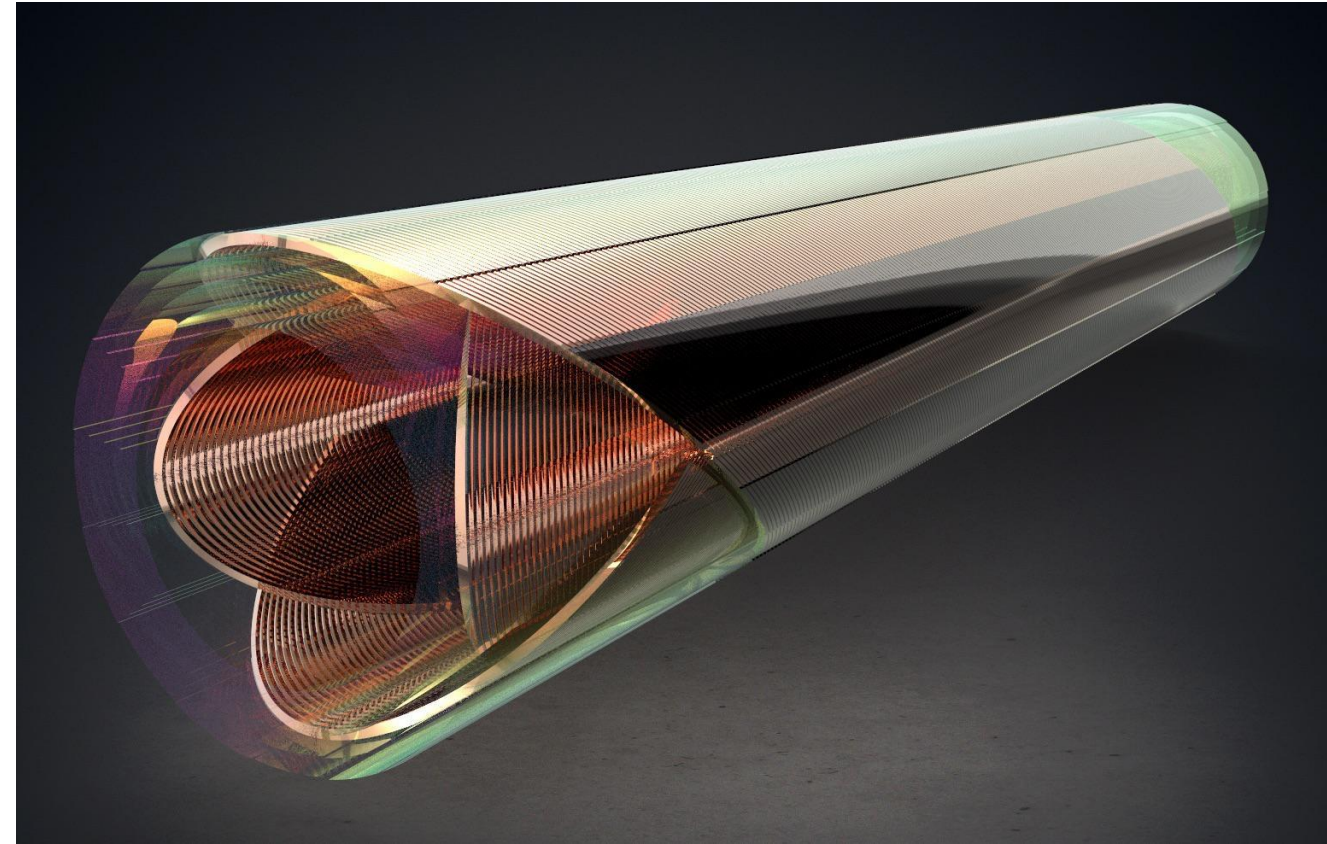
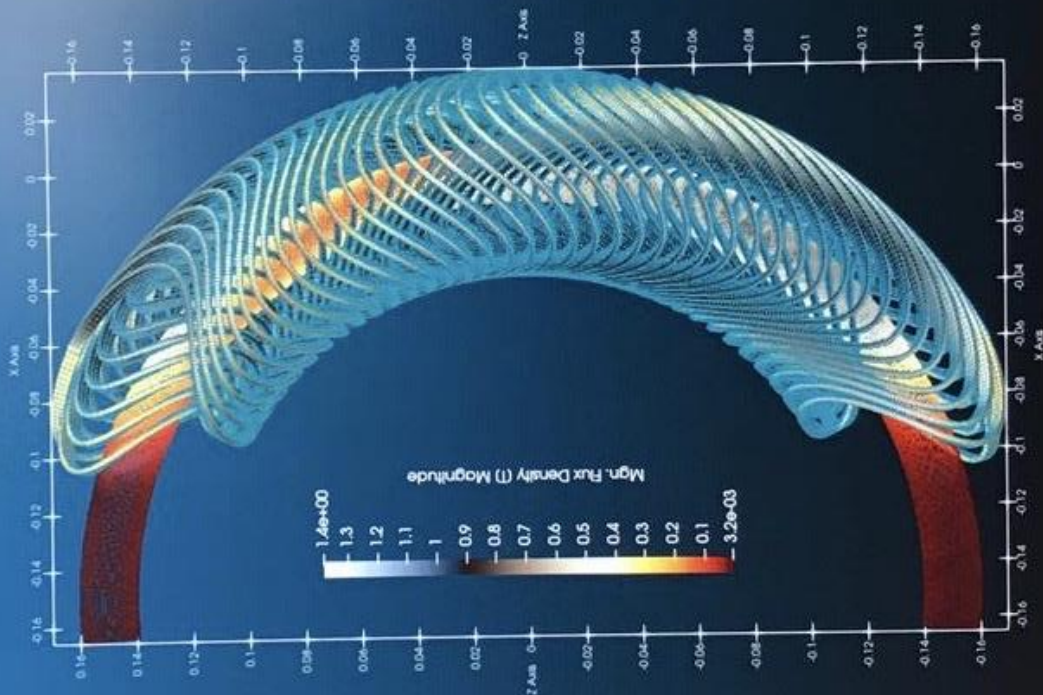
- Discussion
- Decision on stay (or not)
- I will contact all of you THIS WEEK to consolidate your budget if needed, to give the form to compile and sign, etc... Please have in mind who is the **technical contact and the administrative contact**. I want to deal only with 1 person/Institute or Company and 1 person will be contacted by CERN administration
- Check the availability of matching funds. Your directors (for Institutes) will be asked in 3 weeks to sign a letter of committment.
- Budget must be fixed THIS week. Otherwise we can be reduced!
 - **If you have doubt with your directors please check immediateley**. The worst is to wihtdraw half of february: This **will cause losing our budget** since it will be taken back by Maurizio and will not go to other partner of the WP.
- **We are the largest single task. No need to take risk.**
- I need shortly (2 weeks at latest) also to **write** the application and give to Maurizio.

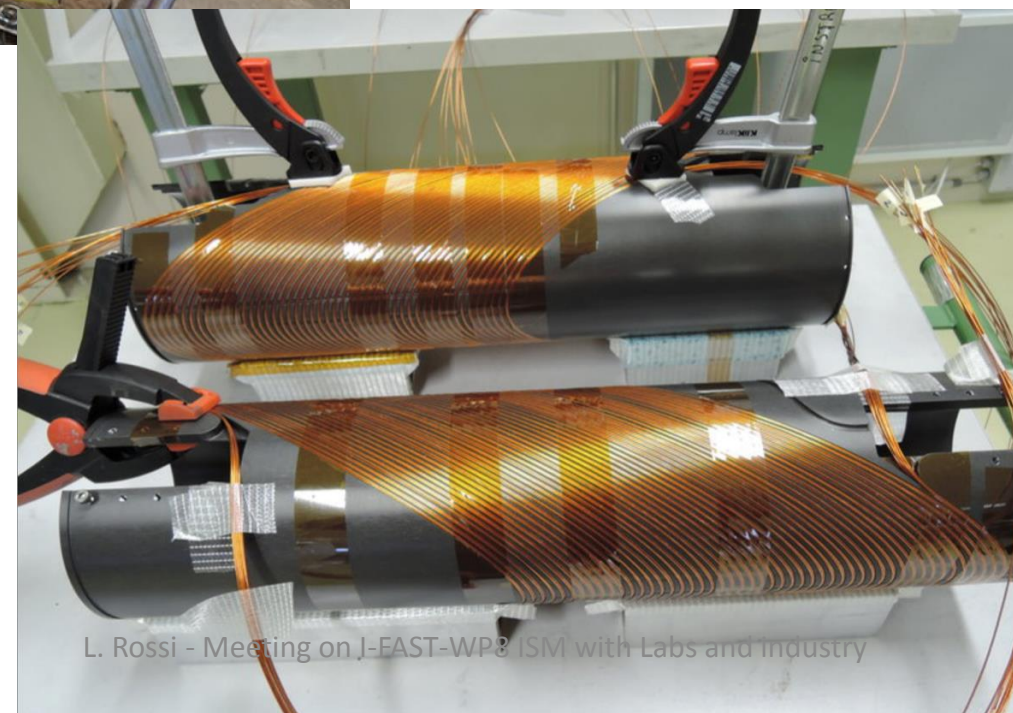
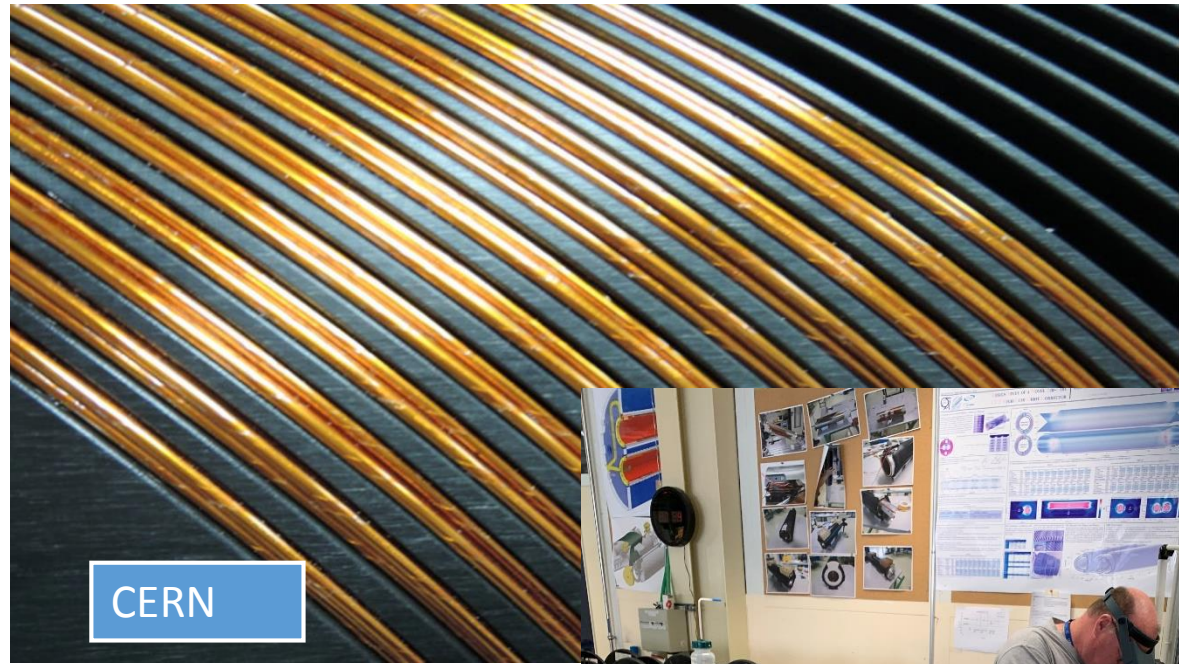
Schedule

- **9 January: meeting of Task Leaders and WP Coordinators:** distribution of templates - confirm list of Task Leaders and WP Coordinators - agree on partners that become Associated.
- **Friday 24 January: deadline** for receiving Task **descriptions** and Task **budgets** from Task Leaders, on the new Templates (with some tolerance with personnel costs).
- **Friday 31 January: deadline** for receiving Excellence and Impact sections of WPs from WP coordinators (advice: merge the text in the proposals).
- **Friday 31 January:** complete list of participants, including scientific and administrative contacts.
- **15 February:** 1st **complete draft** of the proposal ready for comments, **budget frozen** and **Letters of Commitment** sent to all beneficiaries.
- **22 February:** deadline for receiving signed Lol's and comments to draft proposal.
- **6 March:** 2nd complete draft ready and distributed for comments.
- **Friday 13 March:** first complete project submission on EC portal.
- **Tuesday 17 March: final submission**
- **18 March:** champagne and holidays.



Pictures of Glyn Kirby and Jeroen van Nugteren





22 January 2020

L. Rossi - Meeting on J-FAST-WP8 ISM with Labs and Industry