

ESS-DTL

CdS

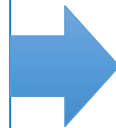
30.06.2016

Paolo Mereu

ESS LINAc Layout

Design Drivers:

High Average Beam Power: 5 MW
High Peak Beam Power: 125 MW
High Availability: > 95%



Key parameters:

-2.86 ms pulses
-2 GeV
-62.5 mA peak
-14 Hz
-Protons (H+)
-Low losses
-Minimize energy use
-Flexible design for mitigation and future upgrades

Financing includes cash and deliverables

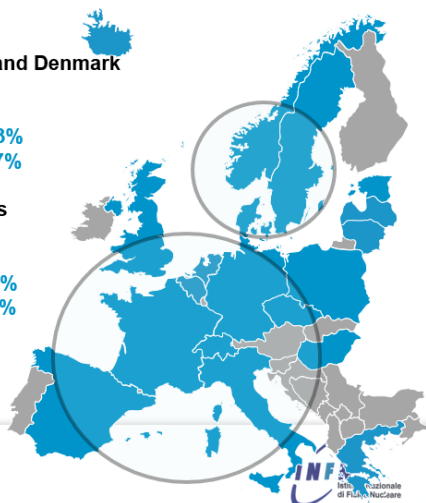


Host Countries of Sweden and Denmark

47,5% Construction
15% Operations
In-kind Deliverables ~ 3%
Cash Investment ~ 97%

Non Host Member Countries

52,5% Construction
85% Operations
In-kind Deliverables ~ 70%
Cash Investment ~ 30%



Italy

Last Updated:

18-Sep-2015

Total Planned Commitment (2013 prices): 110,60 M€ (6,0%)

Cash M€	Cash %	In Kind M€	In Kind %
22,1 M€	20,0% Estimate	88,5 M€	80,0% Estimate

Commitment

- IT is founding member of the ERIC with a total contribution of 110.6 MEUR
- Recognizes the host states' guarantee of 50% of the costs of operation. 'Willing' to contribute to these costs

ESS Liquidity Planning

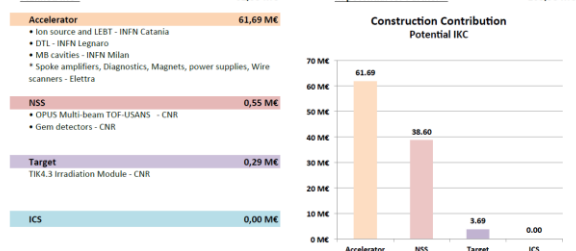
- Cash contributions will be paid in Euros and do not include escalation costs
- Priority will be given to in-kind contributions, cash will be transferred at the end of the ACCE construction phase (from 2019 onwards)

Comments

- Approved IKC from pre-construction phase is 6,186 KEUR
- IT selected 3 institutes to work out allocation of funding. (CNR, INFN, Elettra)
- IT plans to dedicate about 20 MEUR as in-kind contribution to ESS instrument construction.
- Hosts agreed, awaiting signature for Accelerator

Cashflow/Liquidity 2013-2025									
	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cash contribution begins									
Based on LOI received									

ESS IKC Summary		Partner IK Commitment	88,48 M€
Planned IKC*		IK potential for Partner**	103,98 M€

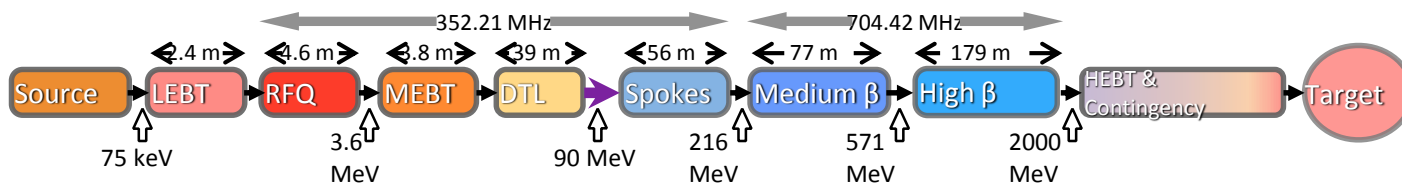


* Planned: ESS participating in bilateral or multilateral discussions leading to a future in-kind agreement.

** Potential: ESS identified in-kind opportunities

Planned IKC/HoA Agreements in 2015

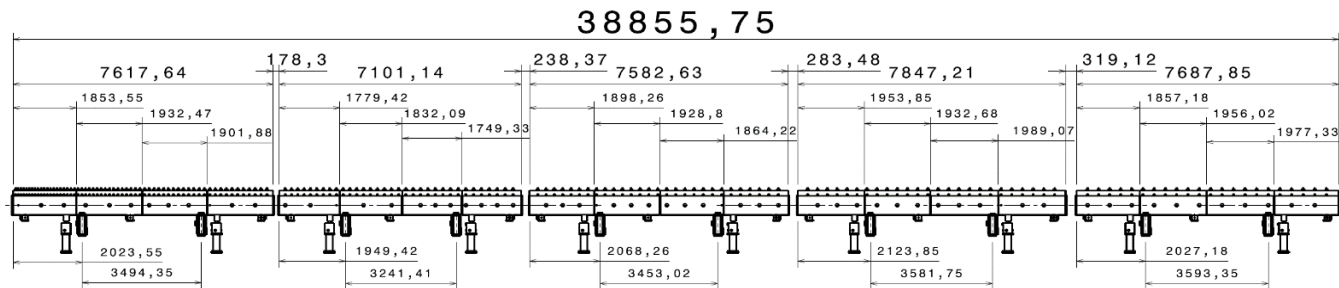
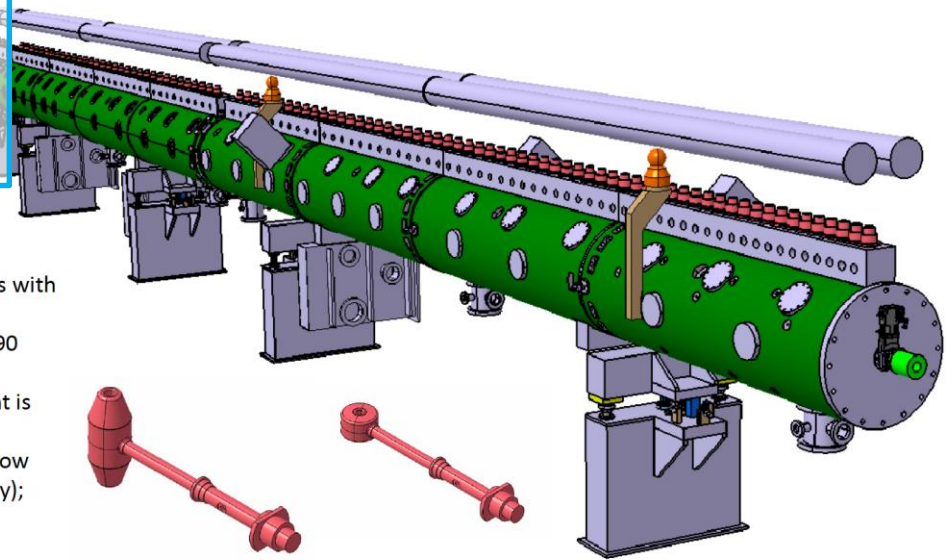
ESS Project	Type of Agreements	IKC Partner	WBS No.	WP description	Status	Planned date	CB Value (KEUR)
ACCSS	HoA	Elettra	11.8.5.5 - 11.17.4	Spoke RF Power Stations	Signed	Q2-2015	1945
ACCSS	HoA	Elettra	NA	Wire scanners	Under Preparation	Q2-2015	568



ESS DTL

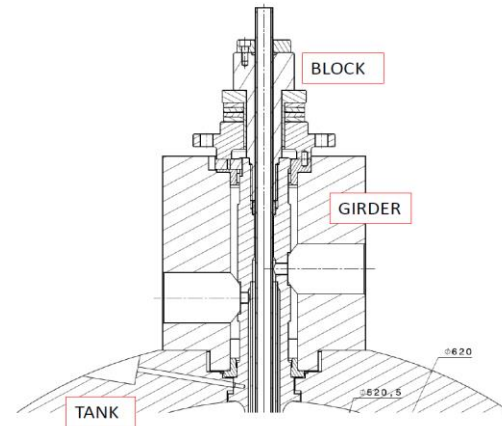
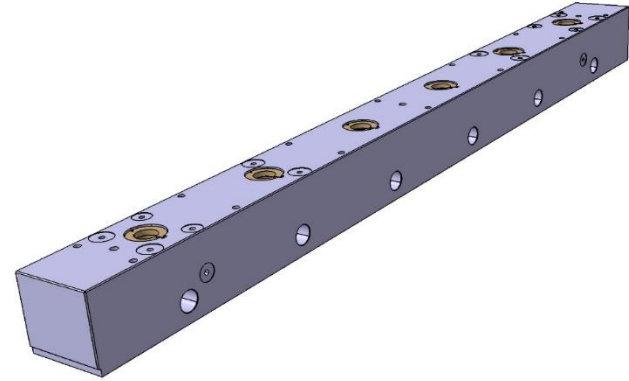
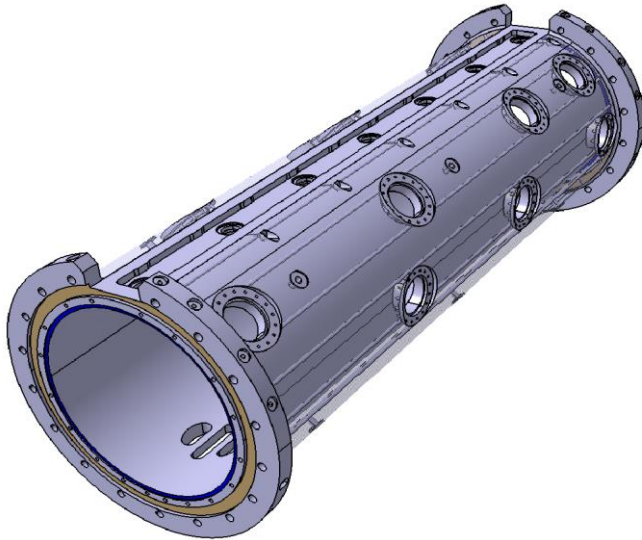
- Andrea Pisent (WU coordinator, LNL)
- Francesco Grespan (deputy coordinator, LNL)
- Paolo Mereu (Mechanics design, Torino)
- Michele Comunian (Beam dynamics, LNL)
- Carlo Roncolato (Vacuum system and brazing, LNL)
- Enrico Fagotti (Accelerator Physics and cooling system, LNL)
- Marco Poggi (Beam instrumentation, LNL)
- Mauro Giacchini (Local Control System, LNL, TBD)

- DTL total length is approx. 38,8 m;
- The DTL is made of 5 independent tanks with 4 segments/modules each;
- Segment length spans from 1740 to 1990 mm;
- Each segment of tank (equipped) weight is approx. 1700 kg;
- DT length spans from approx. 63 mm (Low Energy) to approx. 225 mm (High Energy);
- 4 Intertanks to house the Beam instrumentation



DTL structure

- The precision of the PMQ positioning (0.1 mm) is guaranteed by the stiffness of the tank, the precision of the girder and of the various mechanical couplings.



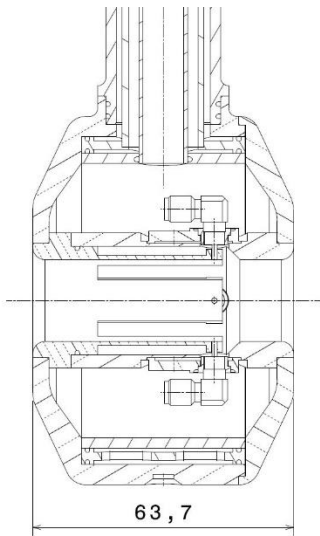
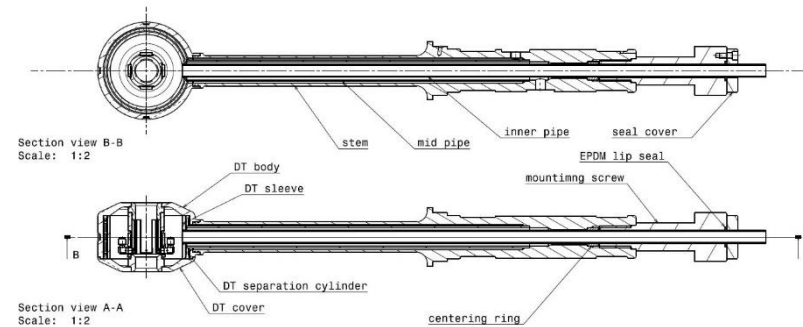
Beam components integrated in DTs

DTs are equipped with:

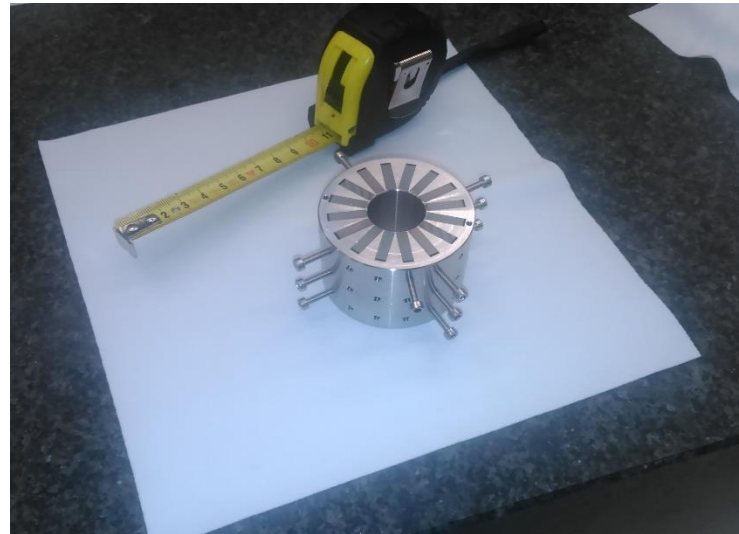
PMQ: Permanent Magnet Quadrupole ;

BPM: Beam Position Monitor;

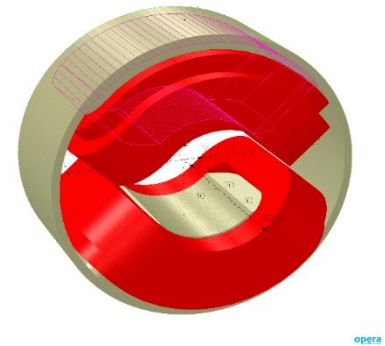
EMD: Electro Magnet Dipole



Beam Position Monitor

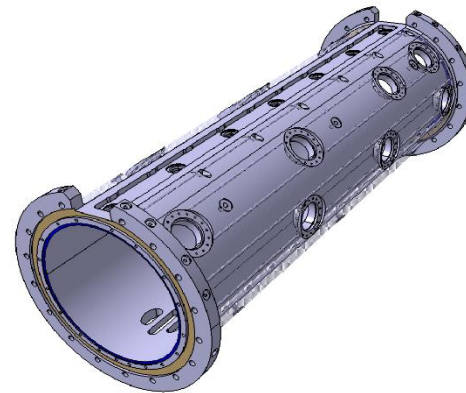
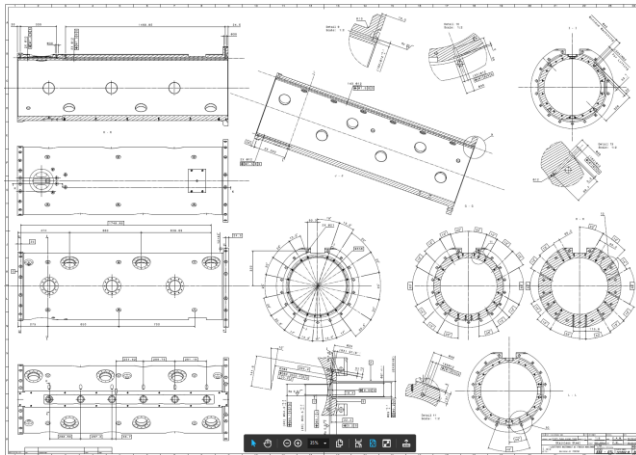
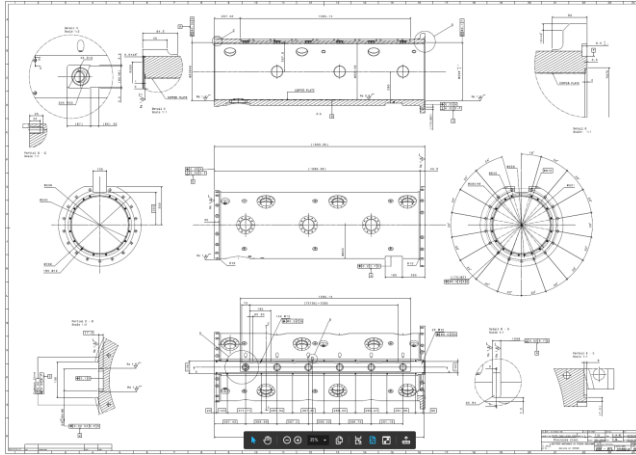


Permanent Magnet Quadrupole



Electro Magnet Dipole

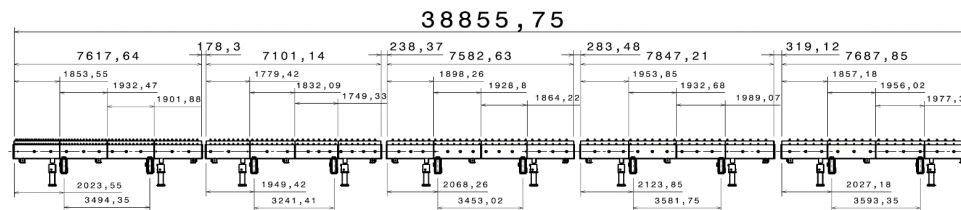
Tank module details



Tank module assembly

1. Forged cylinders production, tank machining, copper plating. Girder and other components, CMM and vacuum tests...
2. Production of the beam components (PMQ, BPM, dipole steerers)
3. Production of vacuum, support and inter-tank components
4. DT Brazed structure production (with cooling circuit tested)
5. Integration of the beam component in the DT
6. E-beam welding sealing, final tests on DTs
7. Assembly of the module (2 m), installation and alignment of the DTs
8. Assembly of the tank (4 modules), alignment, machining of the adaptation rings for relative position, tuning, tuners, ports, vacuum test,...
9. Installation and alignment of the tanks in the tunnel, installation of the intertank plates
10. Installation of vacuum, cooling, RF couplers....

NOTE 1-6 at INFN site, 7-8 DTL workshop at Lund, 9-10 in the tunnel



Planning attuale

Start date: [Signing date]

- RFI date tank #4: 2017-10-20
- RFI date tank #3: 2018-02-22
- RFI date tank #1: 2018-06-01
- RFI date tank #2: 2018-10-01
- RFI date tank #5: 2019-02-01

In-kind agreement del
Drift Tube Linac firmato
dall'INFN a fine Aprile
2016

Laboratorio Tecnologico

- Design meccanico dei moduli del DTL;
- Produzione disegni esecutivi;
- Controllo produzione presso partner esterno dei moduli;
- Prototipazione Drift Tube;
- Controllo produzione dei drift tube presso partner esterno;
- Controllo qualità dei componenti dei Drift tube durante le varie fasi costruttive;
- Assemblaggio dei Drift Tube e dei moduli dei tank
- Trasporto ed installazione

- Procedura negoziata per acquisto semilavorati in acciaio (GE 11044-2016);
- Procedura negoziata per lavorazioni meccaniche su 2 tank (8 moduli) del DTL (GE 11045-2016)
- **1,35 Meuro: valore delle due procedure negoziate**

Manpower a T.D. attuale:

- 1 AdR tecnologo meccanico (2 anni);
- 1 borsista tecnologo meccanico;
- 1 art. 2222 (termine fine settembre)

DOMANDA DI UTILIZZO DEI SERVIZI DI BASE

Data della richiesta:
26.06.2016

Lab. Tecnologico	☒	Lab. Elettronica	☐	Centro di Calcolo	☐
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nuova richiesta	☐
richiesta di continuazione	☒

Esperimento:

ESS-MIUR

Responsabile locale

Mereu

Responsabile dell'attività

Mereu

Descrizione dettagliata dell'attività richiesta

- A. Completamento della attività di prototipazione dei Drift Tube (PMQ, Steerer e BPM), con produzione di particolari meccanici, assemblaggi e controllo dimensionale mediante CMM presso OFM della sezione.
- B. Realizzazione dei disegni esecutivi per la produzione e controllo dell'esecuzione dei Drift Tube presso partner industriale esterno.
- C. Dettaglio dell'integrazione funzionale dei Drift Tube Linac nell'ambito dell'acceleratore di ESS.
- D. Controllo qualità dell'esecuzione, presso partner industriale esterno, dei moduli dei Tank3 e Tank4.
- E. Esecuzione dei modelli dettagliati dei moduli completi dei Tank1, Tank2 e Tank5; definizione e completamento del contratto.
- F. Progetto della attrezzatura di allineamento e montaggio dei moduli dei Tank del DTL.
- G. Verifica termostrutturale, mediante calcolo FEM, del sistema di raffreddamento dei DT e del DTL.

PLANNING													MILESTONES	
Subattività	G	F	M	A	M	G	L	A	S	O	N	D	Data-mese	Descrizione
A.	✓	✓	✓	✓	✓								mar-17	Completamento lavorazione moduli dei Tank3 e Tank4
B.			✓	✓	✓									
C.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	mag-17	Completamento Call for Tender per moduli dei Tank1, Tank2 e Tank5
D.	✓	✓	✓											
E.					✓	✓	✓						lug-17	Completamento Call for Tender per produzione dei Drift Tube
F.								✓	✓	✓	✓	✓		
G.	✓	✓	✓	✓	✓									

Tecnici e tecnologi attualmente assegnati all'attività					Richieste di supporto tecnico per		
INFN		ALTRI ENTI			l'anno:		2017
Nome	mesi/U	Ente	Nome	mesi/U	Tipologia	N.	mesi/U
Dughera	2				Tecnici mecc. /elettr/CdC	1	12
Borotto	3				Disegnatori meccanici	1	6
Panero	3				Microsaldatori		
Mereu	2				Tecnologi progett. mecc.	1	3
Nenni*	7				Tecnologi elettronici/CdC		
Mingioni**	6				Tecnologi microelettronica		

Note:

* Nenni: Borsista tecnologo con presa di servizio 06.2016.

** Mingioni: Assegnista di ricerca tecnologo con presa di servizio 07.2016