

EN Department: *Structure and opportunities*

Roberto LOSITO

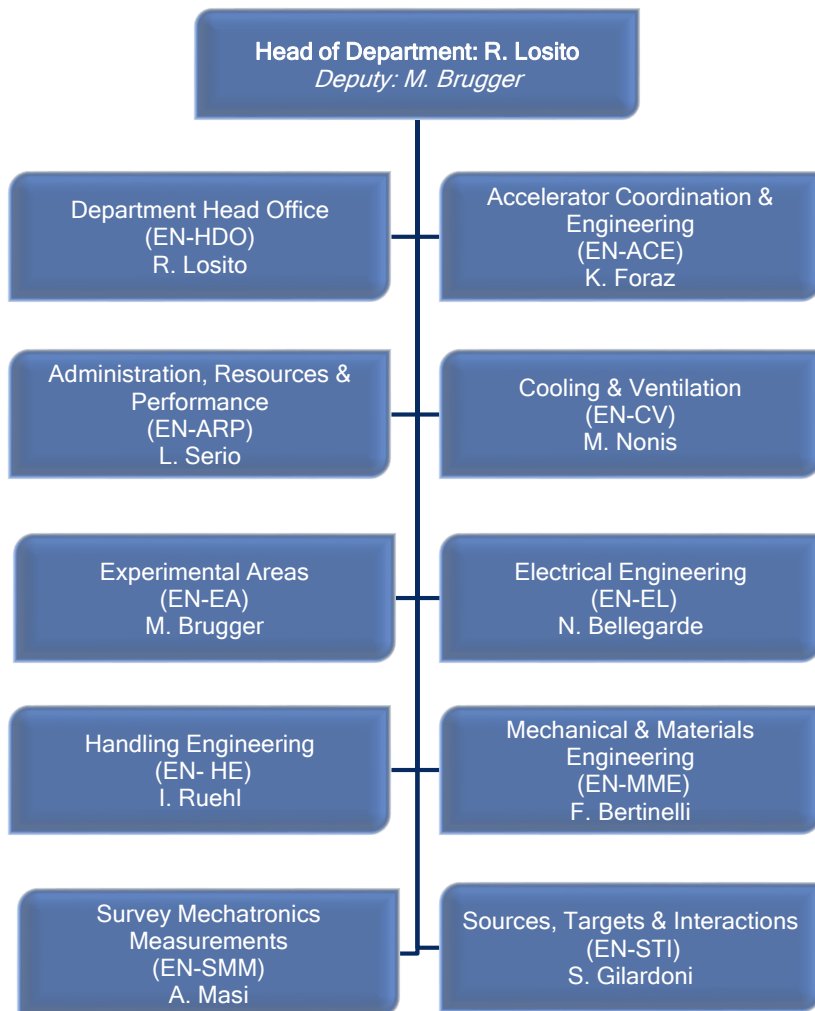


ENGINEERING
DEPARTMENT

CERN Structure

Directorate

Director-General	Fabiola Gianotti
Director for Accelerators and Technology	Frédéric Bordry
Director for Research and Computing	Eckhard Elsen
Director for Finance and Human Resources	Martin Steinacher
Director for International Relations	Charlotte Warakaulle



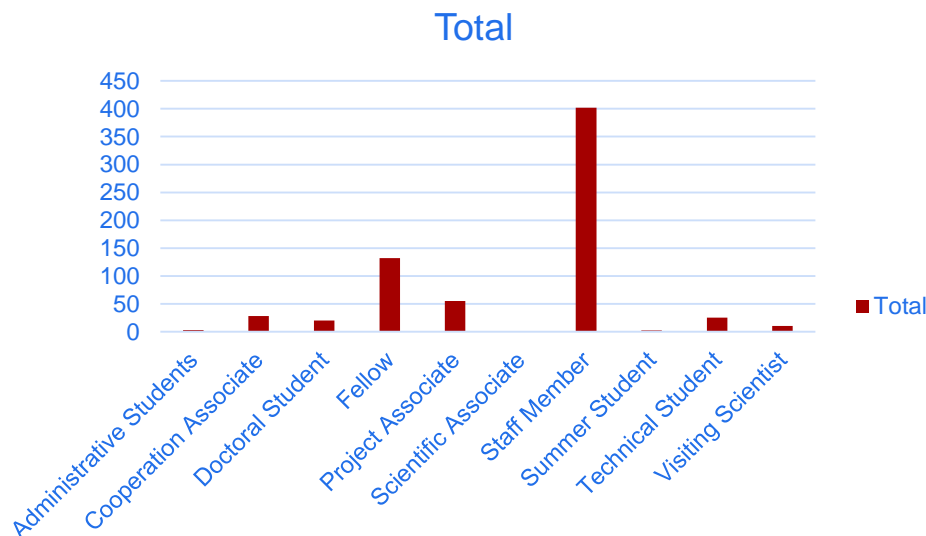
- Operation
 - Infrastructure
 - Accelerators
 - Experimental Areas
- Projects
 - Consolidation
 - Upgrades
 - New facilities
 - Design & Manufacturing
- Studies

Who are we in EN?

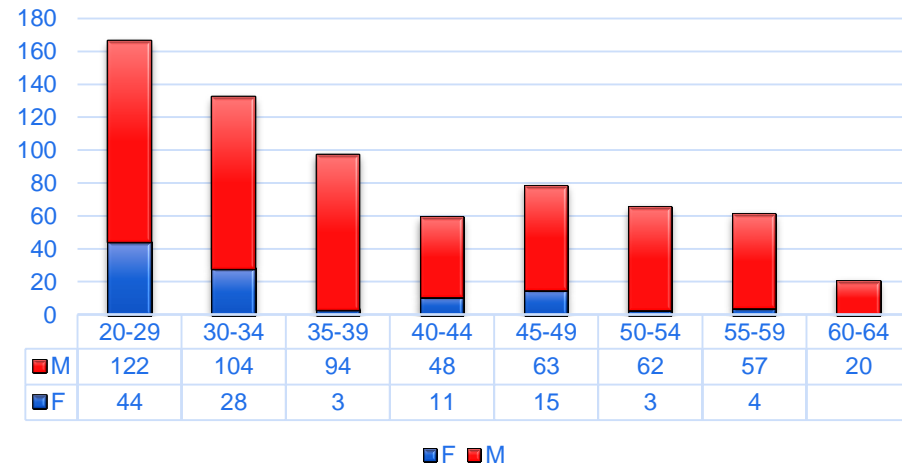
• 34 Nationalities

AT	BE	BG	BJ	CH	CN	CO	CU	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IN	IR	IT	KR	LV	MT	NL	NO	PK	PL	PT	RO	RU	SE	UA	US
7	18	4	1	26	2	1	1	2	34	1	1	60	8	250	25	17	2	8	2	99	1	1	3	9	8	8	35	25	3	5	6	3	2

Administrative work	2
Manual work, Crafts & Trades	1
Office & Administrative work	19
Scientific & Engineering Work	379
Scientific Work (Experimental & Theoretical Physics)	36
Technical work	241
Grand Total	678



MPE, MPAs (except trainees)



NEW

EN-ACE

Accelerator Coordination and Engineering

Katy FORAZ



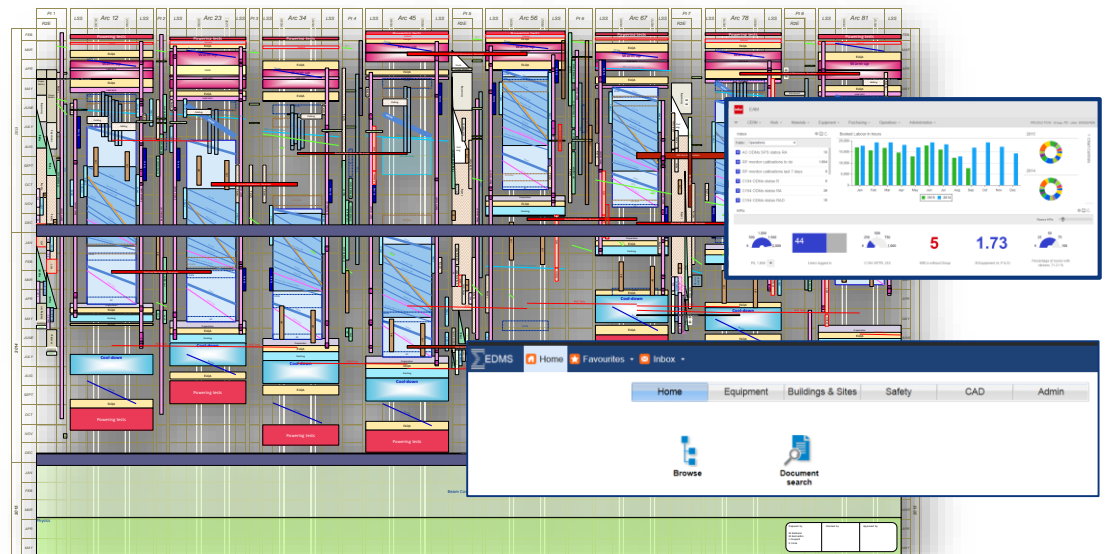
ENGINEERING
DEPARTMENT

ACE : Accelerator Coordination & Engineering Group

The mandate concerns the provision of overarching **project coordination** for the accelerator complex, including **layout management, integration, scheduling, work and safety coordination**, as well as for different projects. It also concerns the development and support of the Organization's engineering, equipment data, **maintenance management tools and mechanical CAD systems**.



Group Leader
Katy Foraz



Project	Foreseen IT date	Foreseen schedule	Remarks
Supply of Motorised doors	2018	2019-2023	
Health and Safety Coordination Services on the CERN Site	2018	2019-2023	
Provision of a PDM/PLM Platform to manage multi-CAD data and Solution Implementation	2019	2019	

CAD 20 project

- All mechanical drawings made with CATIA v5, archived through SMARTeam

- Dassault System announced end of life for SMARTeam end 2020.

2018/19

- Studying how to replace Smarteam with new PDM

- At the same time deciding strategy of engineering software to cover different needs:

- *Mechanical design*
- *Building management*
- *Plant management*

LS2 < T0 < LS3

EN-ARP

Administration, Resources and Performance group


Luigi SERIO



ENGINEERING
DEPARTMENT

ARP : Administration, Resources and Performance group



The mandate concerns the **general administration** (DAO, group secretaries, desktop support, office logistics, travels), and the management of the department **talents**  and **financial resources** (DPO).



Group Leader
Luigi Serio

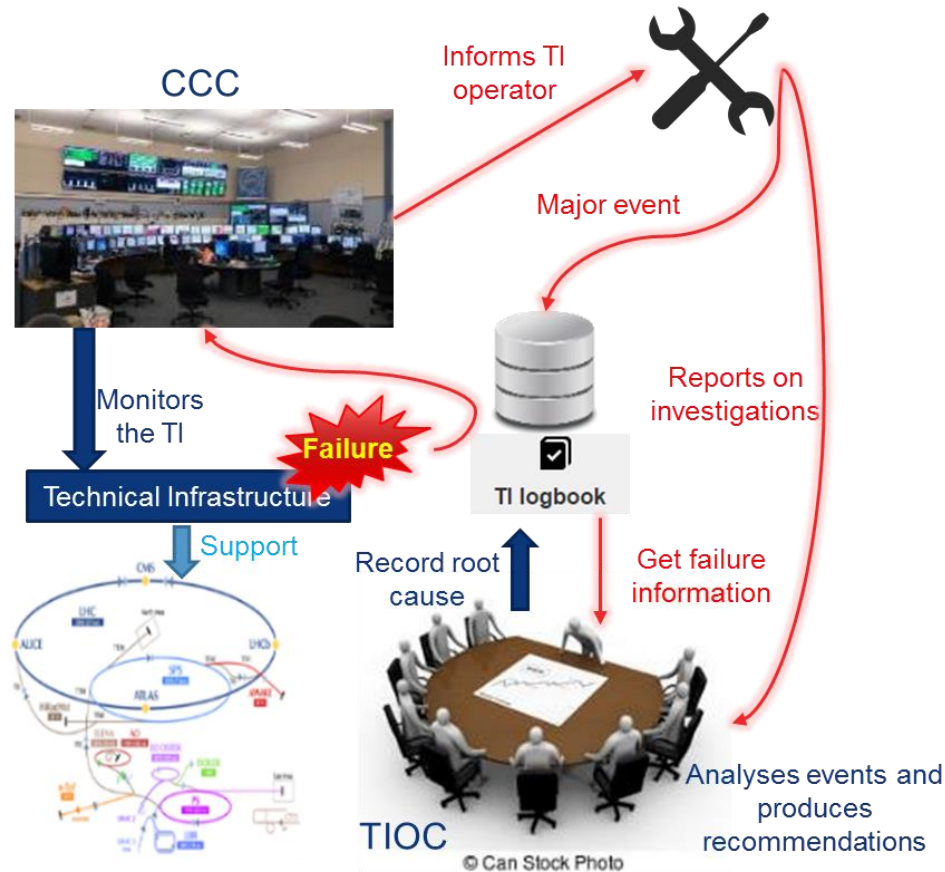


It also concerns support and expertise in matter of **project, risk and quality management** as well as **organizational process** and **performance management**.

Performance Management

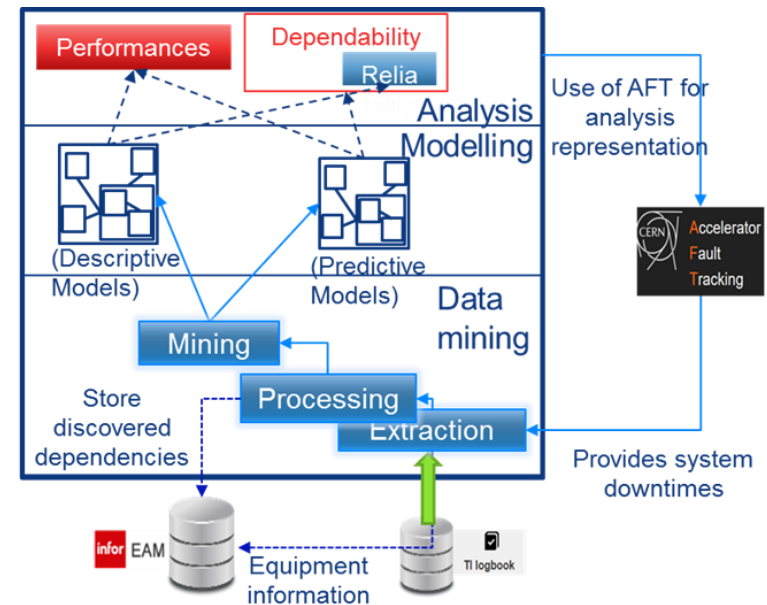
Monitoring and analysis of performances

- post-mortem analysis and coordination of interventions
- identify root causes and propose consolidation actions to minimize impact on the machines complex



Developments:

- Establish representative KPIs
- **Automate** analysis and root causes
- Downtimes calculations
- Model functional dependencies and failure impact propagation



EN-CV

Cooling and Ventilation

Mauro NONIS



ENGINEERING
DEPARTMENT

CV: Cooling and Ventilation Group

The mandate concerns the operation and maintenance of the cooling systems, pumping stations, air conditioning installations and fluid distribution systems for the PS, SPS and LHC including their experimental areas and special cooling systems of LHC sub-detectors. It also provides service to the Computer Centre and some miscellaneous installations.



**Group Leader
Mauro Nonis**



Cooling

Cooling plants (raw, demin. water, C ₃ F ₈ , C ₆ F ₁₄)	150
Pipelines	800 km
Hydrants	800 points
Cooling towers (450 MW)	22
Chilled water plants 6-12 °C (73 MW)	35
Water consumption (peak)	1'260 m ³ /h
Water network (3 pumping stations)	5'400 m ³ /h



*Equivalent to a small town of 25'000 inhabitants.
Annual consumption reduced by 40% in last 8 yrs.*



Ventilation

Heating, ventilation and air conditioning	> 1'500 units from 2'000 to 120'000 m ³ /h each
Compressed air	14 stations 200 km network

	km	m ³ /h
<i>Eurotunnel</i>	50	540'000
LHC	27	290'000



Cooling systems

Project	Foreseen IT date	Foreseen schedule	Remarks
Supply and maintenance of chillers	2019	2020 - 2023	Frame contract (3+1+1+1+1)
Consolidation chilled water pipes in NA	2019	2020	Work in controlled area
Cooling & ventilation circuits for new SPS dump	2019	2020	Work in controlled area
Consolidation power & control system for NA cooling towers	2018	2019	

Ventilation systems

Project	Foreseen IT date	Foreseen schedule	Remarks
Consolidation HVAC in SR1	2019-2020	2020 - 2021	
Consolidation of AD target HVAC	2019	2020	Work in controlled area
Consolidation of Linac 3 HVAC	2018	2019	Work in controlled area
Consolidate the ventilation in bldg 269	2019	2019	Electrical work

Industrial support

Project	Foreseen IT date	Foreseen schedule	Remarks
Maintenance & operation of CV installations on PS and LHC	10/2018	2019 - 2022	MS-4448/EN Frame contract (3+1+1+1+1)

In case of interest, please contact **urgently**

Purchasing Service:

Mrs LARA Cristina - cristina.lara@cern.ch

Tendering for HL LHC

Project	Foreseen IT date	Foreseen schedule	Remarks
Ventilation Plants	2020-2021	2022–2023	Pt 1 & 5 At least 2 contracts.
Cooling Plants	2020-2021	2022–2023	Pt 1 & 5 At least 2 contracts.

Splitting of activities between contract still to be defined:

- Surface vs underground
- Point 1 vs Point 5
- According to schedule

EN-EA Experimental Areas

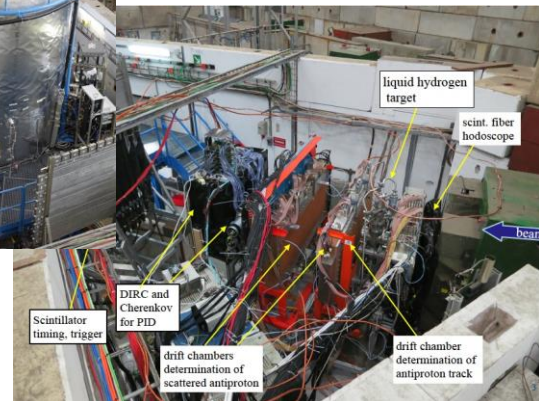
Markus BRUGGER



ENGINEERING
DEPARTMENT

EA : Experimental Areas Group

The mandate concerns the beamlines, infrastructure and management of **CERN's experimental areas** and provides **engineering support and relevant technical services** including associated contracts. EA is furthermore supporting the **LHC experiments** and **managing the respective ATS interface**, as well as participating in and partly hosting the management of a number of CERN-wide projects (AWAKE, etc.).



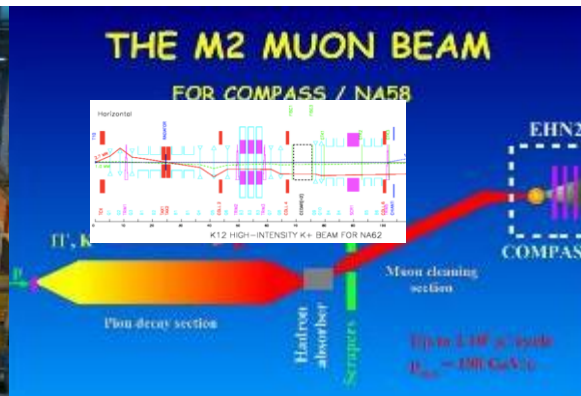
Group Leader
Markus Brugger

EA : Experimental Areas Group

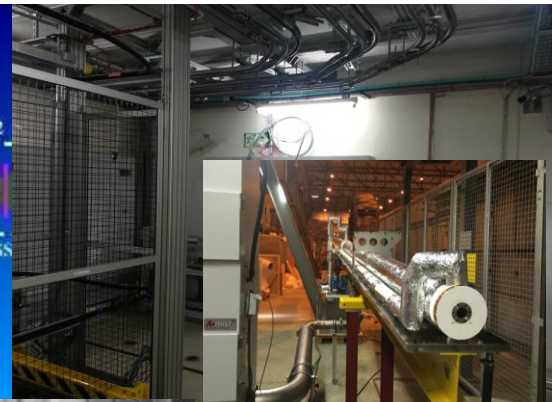
EXPERIMENTAL AREAS



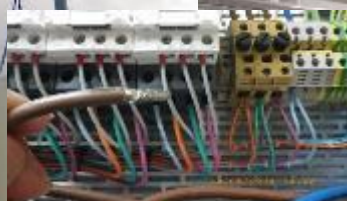
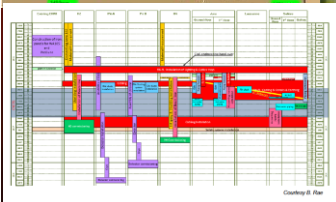
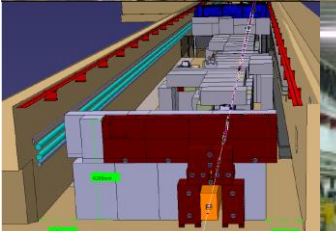
BEAMLINES



FACILITIES



PROJECTS



SUPPORT ACTIVITIES

**MECHANICS, VACUUM, CABLING, SCAFFOLDING, INTEGRATION, GAS,
INSTRUMENTATION, DESIGN, PROTOTYPING, SHIELDING,
PLANNING, COORDINATION, SAFETY**

Contracts (in prep. / upcoming)

- **HL-LHC**

- **ATLAS-JTT plug 1 Shielding – HL/LHC WP08:** Supply of two JTT plugs 1 for ATLAS detectors in the WP08/HL-LHC framework. The approximated total weight needed is around 22 tons in ductile cast iron [delivery end of 2018]
- **VAX supports:** Mechanical supports (x2) for VAX assembly [order in 2019]

- ***East Area Renovation***

- **Vacuum pipes:** Purchase stainless steel beam pipes for beam lines. Raw materials (round tubes) and fabrication of special pipes (Y shape) [order to be launched by the end of 2018]
- **False floor in b.251:** Complete new false floor to install (650 m2) (supply + installation) [order in 2019]
- **Equipment support:** Mechanical supports for magnets and beam instrumentations [launch in 2019]
- **Counting rooms:** three standard counting rooms (3 x 40 m2) for Experimental Areas (supply + installation) [launch in 2019]

Contracts (in prep. / upcoming)

- **Cast iron blocks – Shielding – *CERN wide*:**

- Blanket contract for the supply of CERN standard cast iron blocks for shielding purpose (500 tons basis)

[Dispatch to firms in September 2018, contract to enter in force beginning of 2019]

- **Connectors/Cable Bundles**

- Supply of system interconnections and industrial wiring. The Supply is related to the production of cable assemblies, wire harnesses and electromechanical box assemblies at the contractor and CERN premises. This includes the cable preparation, the connector terminations, the functional qualification of the assemblies, connector fitting on cables already laid in on-site CERN technical

[MS-4469/EN currently in final preparation, contract launch foreseen for Q2/2019]]

EN-EL

Electrical Engineering

Nicolas BELLEGARDE



ENGINEERING
DEPARTMENT

EL : Electrical Engineering Group

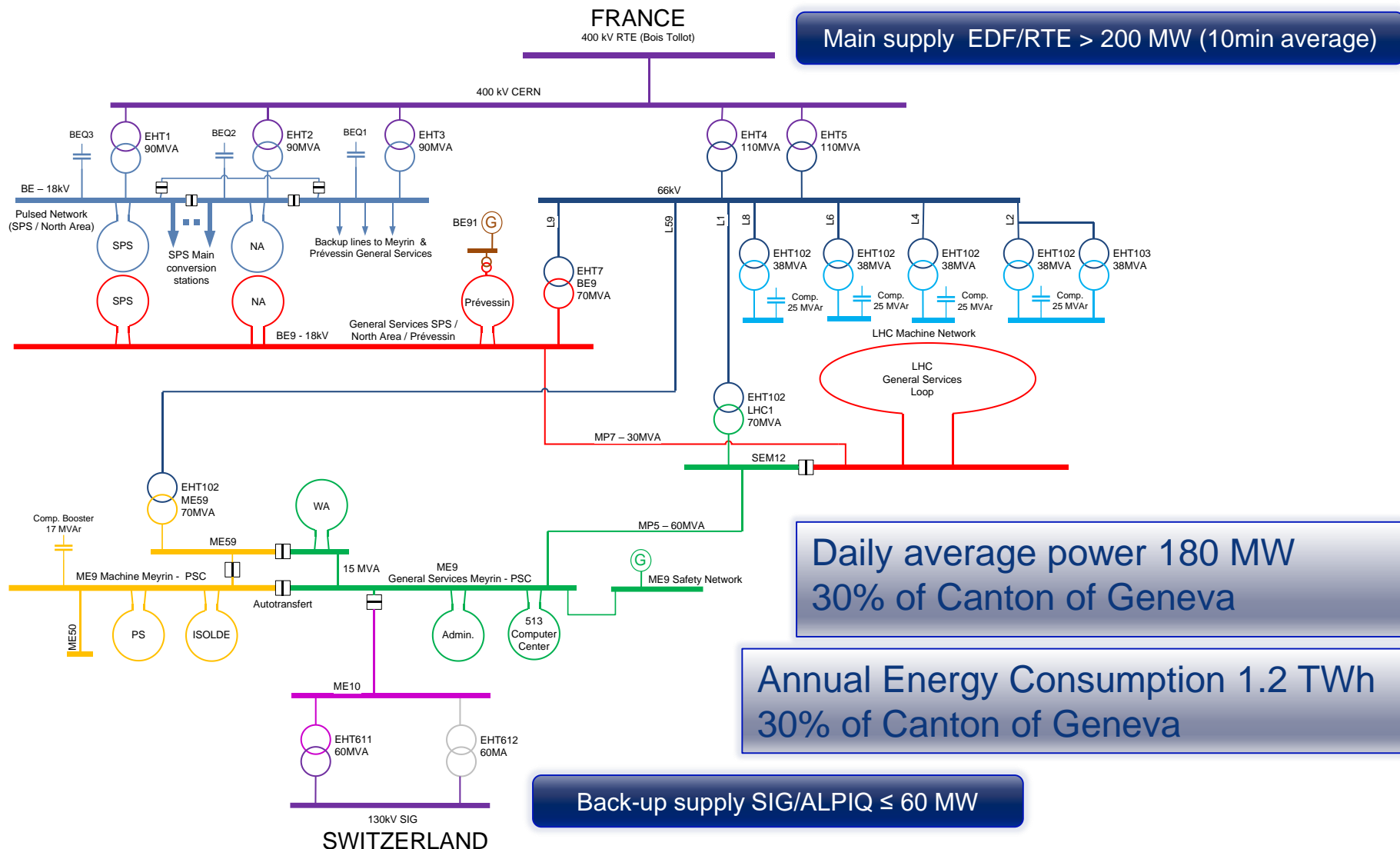
The mandate concerns the **electrical distribution network** from 400 kV to 400/230 V. Its main missions are to operate, maintain, extend and renovate the network, analyse and make forecasts for CERN electrical energy consumption and manage relations with the energy suppliers.



Group Leader
Nicolas Bellegarde



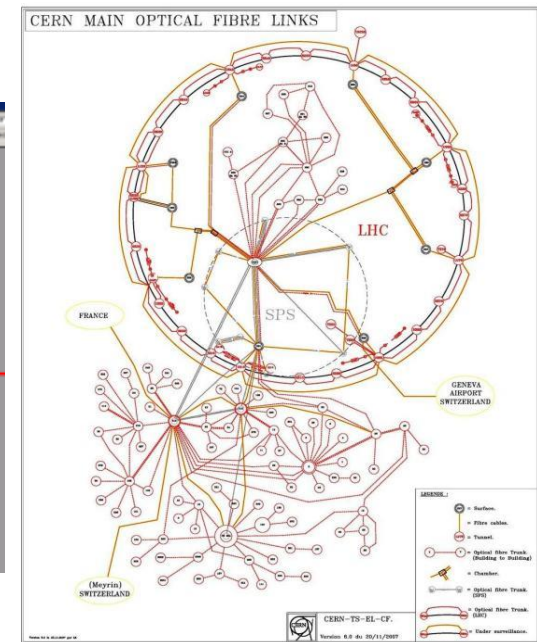
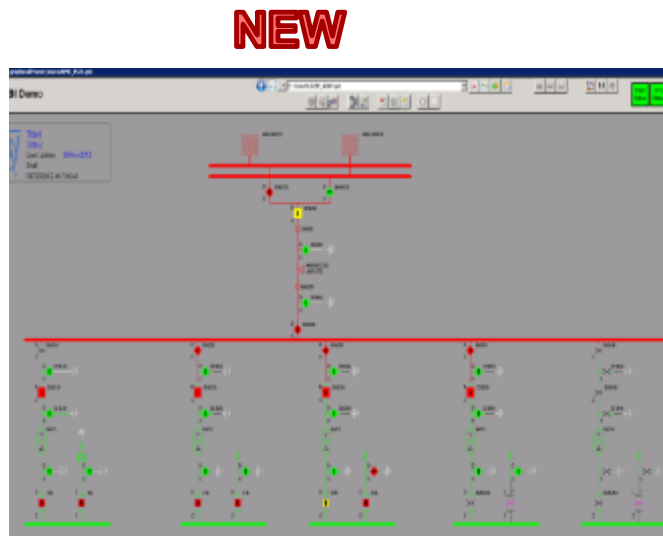
Electricity Distribution



EL : Electrical Engineering Group

The mandate also concerns the **cabling activities**. Its main missions are to install control cables, water cooled cables, and fibre optics for users. This activities include the management of infrastructures (cable trays, ducts, patch panels,etc.) and the necessary removal of old and unused installations.

EN-EL is also in charge of the controls of their distribution network.



Future Invitations to Tender

Replace contract n°	Contract Description	Comments
--	Supply of optical fibre terminal equipment, patch cables and patch cords	MS + IT 2020
B1377/EN/LHC	Supply Of Flexible Water-Cooled Copper Cables For HL-LHC	MS + IT TBD
B1368/EN	Supply Of Cast-Resin Dry-Type Power Transformers 18/0.4 kV, 18/3.3 kV And 3.3/0.4 kV	MS + IT 2018
B1354/EN	Supply, Installation, Commissioning And Maintenance Of Static Uninterruptible Power Supply (Ups) Units	MS + IT 2019
B1369/EN	Supply, Installation, Commissioning And Maintenance Of 48 V Dc Production And Distribution Battery-Based Systems	MS + IT 2020

EN-HE

Handling Engineering

Ingo RUEHL



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DEPARTMENT

HE : Transport and Handling Group

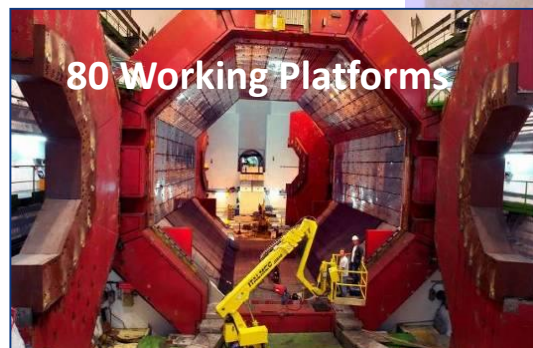
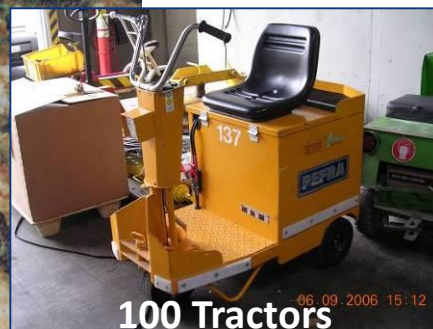
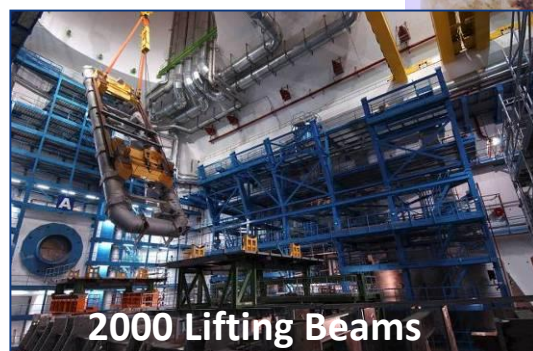
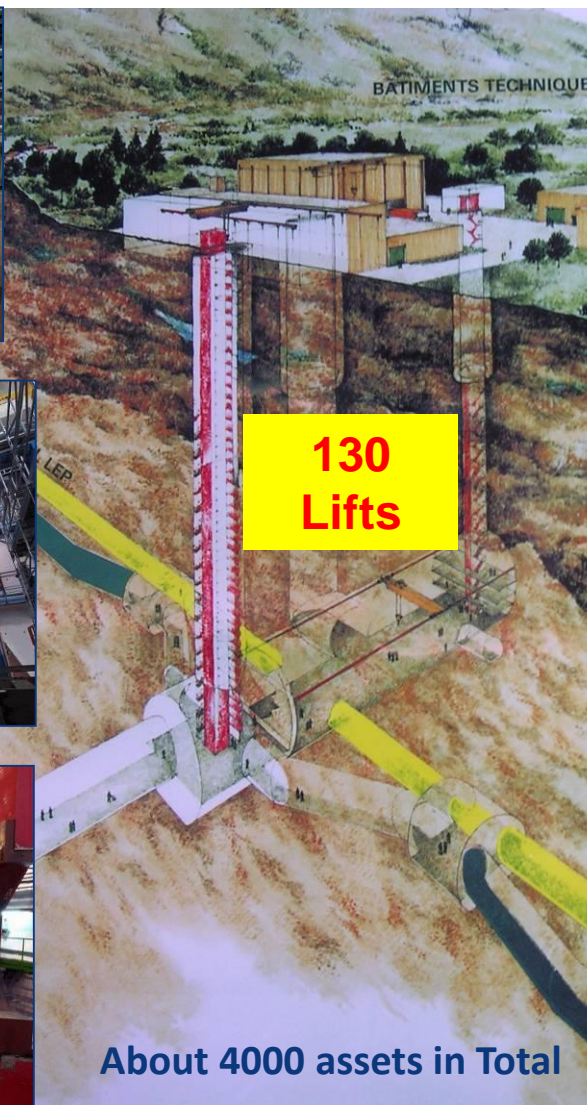
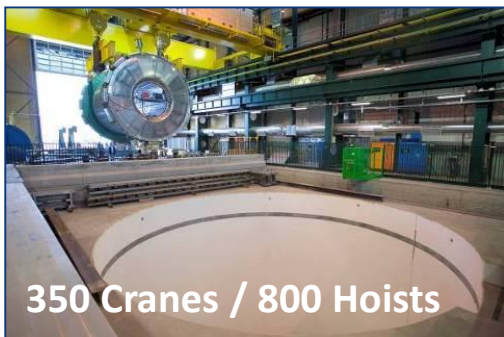
The mandate concerns **transport and handling services for the CERN technical infrastructures, accelerators and experiments**. This includes the design, the tendering/procurement, the installation, the commissioning, the operation, the maintenance and decommissioning of standard industrial and custom built transport and handling equipment.



Group Leader
Ingo Ruehl



HE : Transport and Handling Group



Ref.	Unit	Description	Contract Type	Scope	Year
DO	EN-HE-PO	Replacement of a trailer for the transport of floor operating vehicles with large dimensions (yard cranes, MEWPs, etc.) by a goose neck semi-trailer	Supply	New Equipment	2019
DO	EN-HE-PO	Road transport of ATLAS small wheels	Service	Special Transports	2019
DO	EN-HE-PO	Replacement of road truck with 6m flatbed and tarpaulin	Supply	New Equipment	2019
DO	EN-HE-HEM	Refurbishment of 1 ROCLA vehicle	Supply	Consolidation	2019
IT	EN-HE-HEM	EOT cranes up to 10t capacity	Supply	Consolidation	2019
DO	EN-HE-PO	Replacement of road truck with 8m flatbed	Supply	New Equipment	2020
DO	EN-HE-PO	Replacement of a 100t road tractor for semi-trailers	Supply	New Equipment	2020
DO	EN-HE-HEM	Replacement of 2 lifts in North Area	Supply	New Equipment	2020
DO	EN-HE-HEM	1 x MAFI convoy electrical refurbishment	Supply	Consolidation	2020
IT	EN-HE-HEM	EOT cranes for HL-LHC project	Supply	New Equipment	2020
DO	EN-HE-HEM	Replacement of electrical forklifts CH519 & CH520	Supply	New Equipment	2020
DO	EN-HE-PO	LHC inner triplet transport and installation vehicle	Supply	New Equipment	2021
IT	EN-HE-HEM	Replacement of 10 standard lifts in tertiary buildings	Supply	New Equipment	2021
DO	EN-HE/PO	Replacement of a 80t extensible semitrailer for LHC Cryomagnets	Supply	New Equipment	2021
IT	EN-HE-HEM	New maintenance contract hot cranes and hoists	Service	Maintenance	2021
IT	EN-HE-HEM	New maintenance contract for industrial trucks	Service	Maintenance	2021
IT	EN-HE-HEM	New maintenance contract for lifts in tertiary buildings	Service	Maintenance	2021
IT	EN-HE-HEM	New maintenance contract for lifts in controlled areas	Service	Maintenance	2021
DO	EN-HE-PO	Industrial tow tractor (electrical) with 35t capacity and narrow aisles for LHC TAN transport	Supply	New Equipment	2022

EN-HE

Mechanical and Materials

Engineering Group

Francesco BERTINELLI

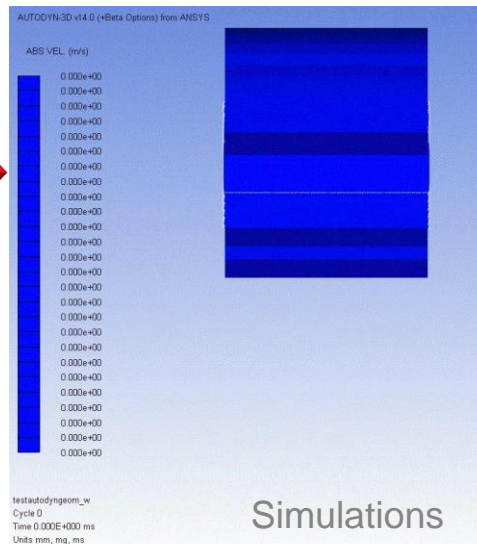


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MME: Mechanical and Materials Engineering Group

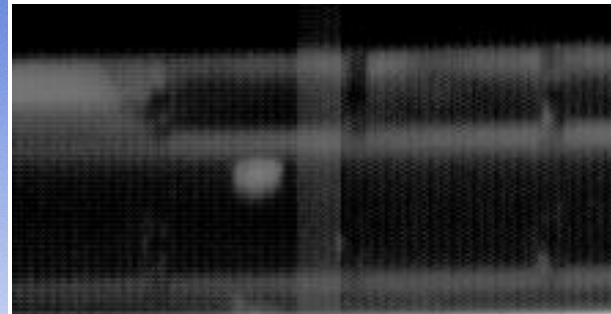
The mandate of the MME group is to provide to the CERN community specific engineering solutions combining **mechanical design, fabrication and material sciences**, using **in-house** and **industry** facilities, for beam accelerator components and physics detectors.

➔ Prototypes and development work

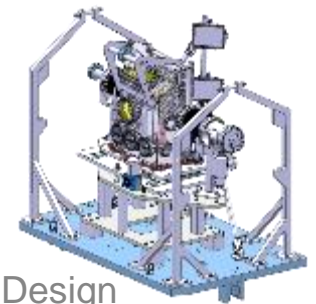


Simulations

Group Leader
Francesco Bertinelli



Measurements



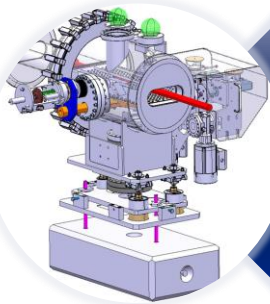
Design



Fabrication & Assembly



MME : domains of activities



Design

- **Design Office**
 - 50+ designers and 15+ engineers
 - CATIA v5 / SmarTeam, ANSYS, LS-Dyna
- **Mechanical Measurements Lab.**



Fabrication

- **Mechanical workshop** (4000 m²)
 - 60+ technicians and 10+ engineers
 - CNC machining
 - Assembly & metal forming
 - Welding (TIG, MIG, electron beam, laser, vacuum brazing)
- **Technical Subcontracting unit**



Materials

- **Material science consultancy**
 - metallurgical analyses, microscopy including FIB, mechanical tests
- **NDT:** UT, radiography, microtomography
- **Metrology:** 350 m² Lab., several CMM

EN-SMM

Survey, Mechatronics and

Measurements

Alessandro MASI



ENGINEERING
DEPARTMENT

SMM: Survey Mechatronics Measurements

The Survey Mechatronics and Measurements Group (SMM) is responsible for the **geodetic metrology** of the accelerators and experiments for the whole CERN site, the design and the operation of the **mechatronics** of the **beam intercepting devices** (BIDs) in CERN accelerators as well as the development of **robotic solutions** for remote inspections and tele-manipulation in radioactive areas. SMM provides support for all measurements, test systems and data analysis applications based on **LabVIEW** as well as support on radiation tests of electronic components and systems for radiation tolerant design.

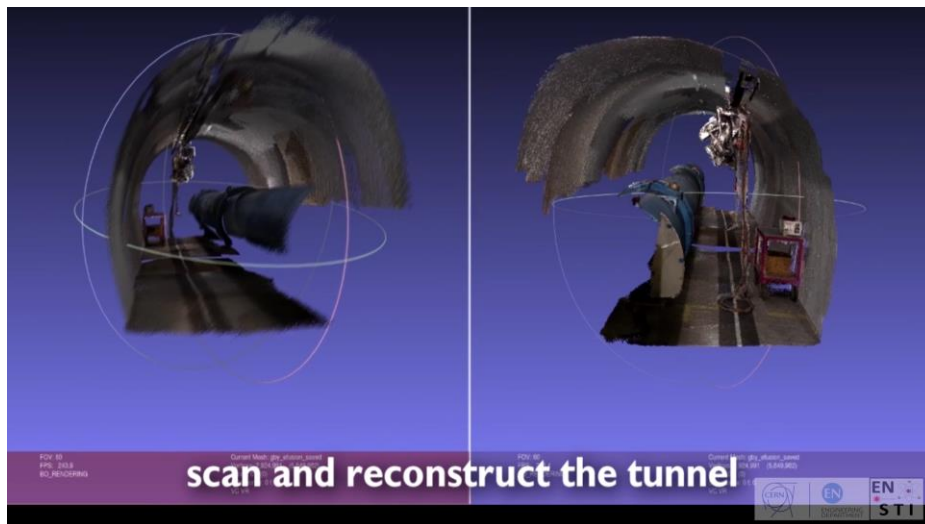


Group Leader
Alessandro Masi



Robotics

- Use robotics for intervention in radioactive areas
 - No large contracts foreseen, but excellent opportunities for collaboration
 - Contact person: Mario Di Castro, Alessandro Masi



Ref.	Unit	Description	Contract Type	Scope	Year
DO	EN-SMM-HPA	Equipment (targets and feedthroughs) for the Cold Mass monitoring of the series production	Supply	HL-LHC	Jun 2019
DO	EN-SMM-HPA	FSI system (for qualification) and then to be installed either at point 1 or 5	Supply	HL-LHC	Dec 2019
DO	EN-SMM-HPA	Hydrostatic Levelling Sensors and Wire Positioning Sensors to be installed in the string	Supply	HL-LHC	Oct 2019
DO	EN-SMM-HPA	Motors to be installed in the string for the alignment of cryostats	Supply	HL-LHC	Oct 2019
DO	EN-SMM-HPA	Mechanical parts: jacks and other mechanical equipment	Supply	HL-LHC	Oct 2019
DO	EN-SMM-HPA	2nd FSI system needed (either for point 1 or point 5)	Supply	HL-LHC	Jun 2023
DO	EN-SMM-HPA	Hydrostatic Levelling Sensors and Wire Positioning Sensors to be installed in the cryostats of the series production	Supply	HL-LHC	Mar 2023
DO	EN-SMM-HPA	Motors to be installed in the string for the alignment of the series production of cryostats	Supply	HL-LHC	Mar 2023
DO	EN-SMM-HPA	Mechanical parts: jacks and other mechanical equipment for the cryostats series production	Supply	HL-LHC	Mar 2023
IT	EN-SMM-MRO	Rad Tolerant switches for HL-LHC LHC Collimators	Supply	HL-LHC	Dec 2018
IT	EN-SMM-RME	High Availability PXIe Chassis and Compact PCI Serial for LHC Collimators controls consolidation and HL-LHC remote alignment	Supply	HL-LHC Consolidation	Feb 2019- Mar 2023
DO	EN-SMM-RME	Electronic cards series production for LHC Collimators controls consolidation and HL-LHC remote alignment	Supply	HL-LHC Consolidation	Jan 2023

EN-STI

Sources, Targets and Interactions

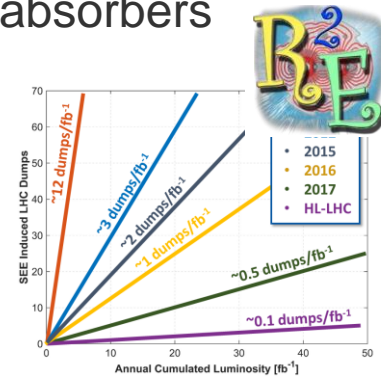
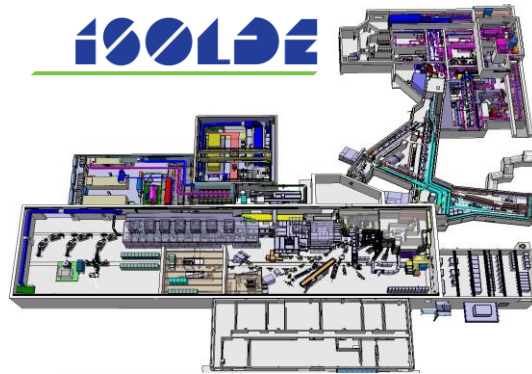
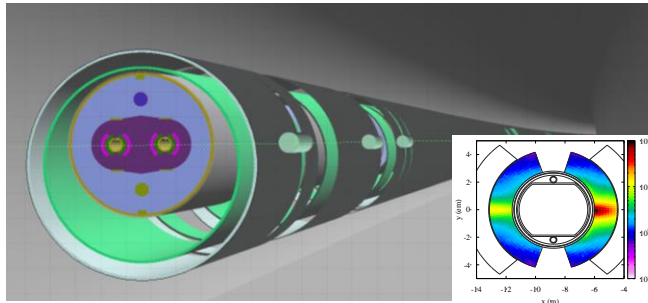
Simone GILARDONI



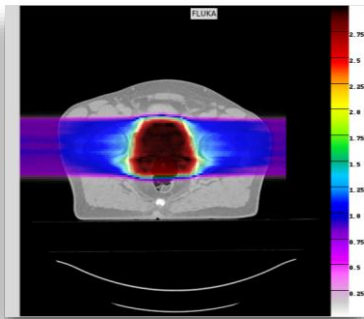
ENGINEERING
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STI : Sources, Targets and Interactions Group

The group is responsible for the **study of beam interactions with matter and all associated accelerator devices**, aiming to apply its know-how to particle generation (ISOLDE Radioactive beam sources, CLIC photoinjectors and polarized e^+e^- sources), and to particle interception (collimators, absorbers and dumps).



Group Leader
Simone Gilardoni



Activities

- In charge of special mechanical engineering devices, submitted to beam impact and therefore extremely stressful conditions
- Typically need high accuracy, special materials, strict quality control.
- Qualification criteria often very restrictive:
failure of the equipment implies intervention on very radioactive items.

Materials

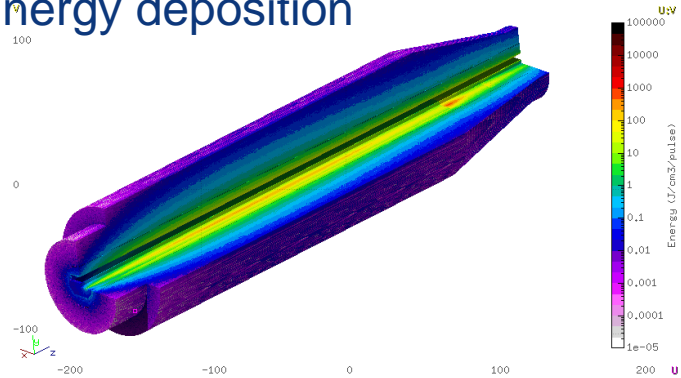
- Typically look for structural materials with excellent elastic region, good thermal conductivity, good strength
 - Glidcop
 - CuCrZr
 - Refractory metals

Collimators

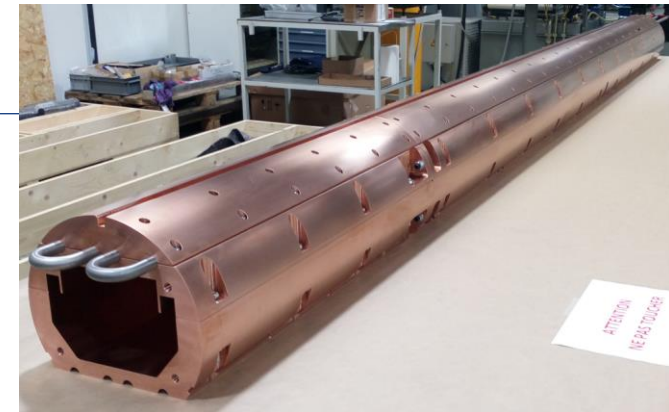
- Most radioactive items in the LHC
- Designed to be maintenance free
- Require various know-how in once:
 - Precision machining
 - Electron Beam Welding
 - Brazing
 - Mechanical design

From paper to reality

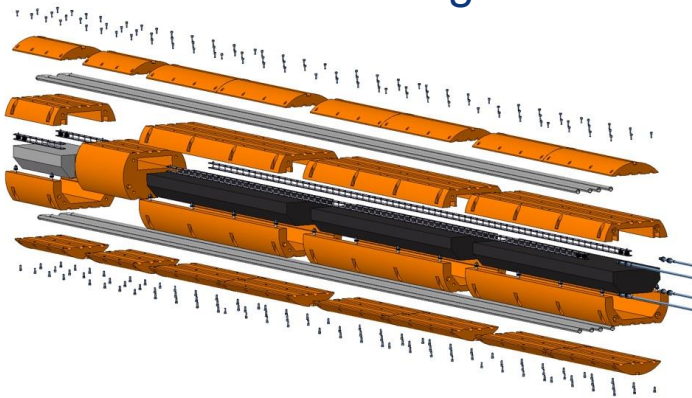
Energy deposition



Follow-up of production in industry



Detailed design

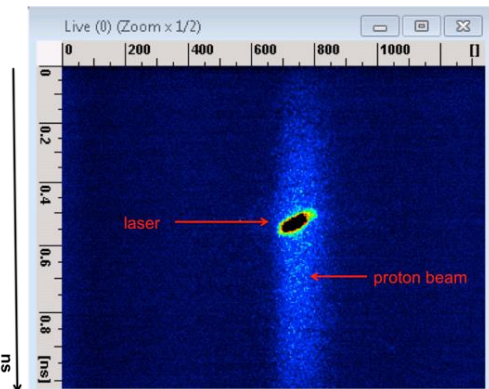


Assembly, installation, operation

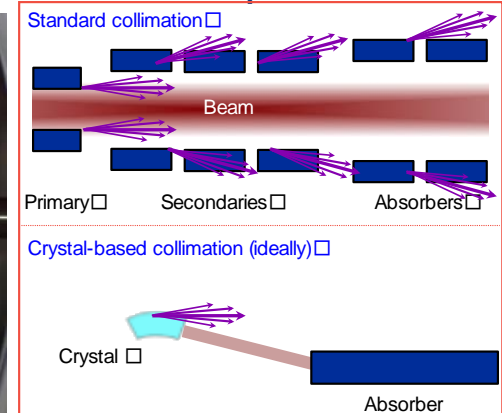
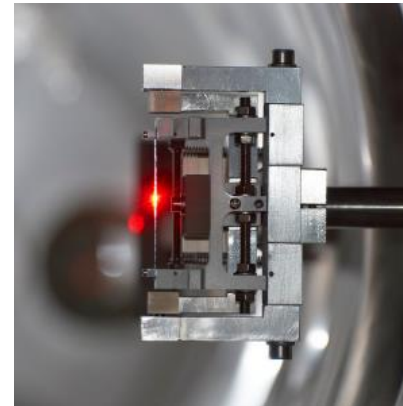


Support to experiments and facilities

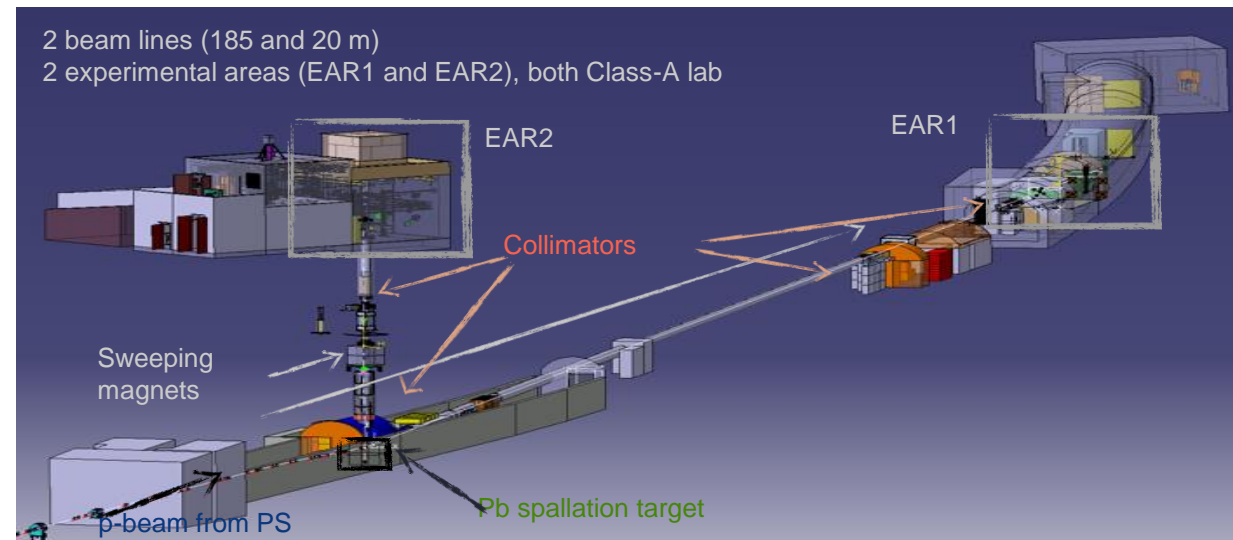
AWAKE : laser and electrons



Crystal collimation and particle extraction in collaboration with UA9 experiment



2 beam lines (185 and 20 m)
2 experimental areas (EAR1 and EAR2), both Class-A lab



n_TOF experiment

- Design, build and operate the neutron beam (beam, target, collimators,...)
- Design, build and operate the experimental areas

Coming requests in 2018/19 (I/II)

Project/Items	Foreseen date	Remarks/Details
ISOLDE targets (replacing existing contract)	IT in 2019	Production of vacuum vessels
R2E	end 2018/early 2019	MS/IT-4440 on Irradiation Tests
Graphite for TIDVG5	DO end of 2018	SPS beam dump for LS2
TZM for TIDVG5	DO early 2019	SPS beam dump for LS2
TIDVG5 vacuum chamber	DO end 2018, reception in 2019	SPS beam dump for LS2
TDIS back-stiffener TZM	end of 2018	LHC device for LS2
TIDVG5 HIP CuCr1Zr/SS	DO in 2018, reception 2019	SPS beam dump for LS2
HL-LHC collimators parts	DO end 2018/early 2019	Flexibles/rigid mechanical parts
HL-LHC collimators water manifolds	DO in 2018	
PSB absorber/scrapper parts	DO end 2018/early 2019	different equipment (flanges, mechanisms, etc.)
Graphite for PSB absorber/scrapper	DO end of 2018	
PS internal dump	DO end 2018/early 2019	precision mechanical part for mechanisms

Coming requests in 2018/19 (II/II)

Project/Items	Foreseen date	Remarks/Details
AD target	DO end 2018/early 2019	movable shielding
AD target	DO in 2019	air compressor for target cooling
AD target	DO in 2019	core Ta+Ir raw materials
AD target	2019	building 196 - IT-4465/SMB
AD target	2019	chassis (232+zone cible)
n_TOF	tbd	irradiation shuttle/ still pending budget availability - tbc
n_TOF target	DO in 2019	shielding blocks
Beam stoppers	DO in 2019	core material (Inconel and CrCr1Zr)
Beam stoppers	DO in 2019	Vacuum chambers
Group mechanical workshop	DO in 2019	Milling machine and Lathe
BDF	tbd	T6 target prototype PIE
BLIP/collimators	tbd	PIE (post irradiation experiments)



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