
CERN

CALLAB, CLEAR and CERF
A wide range RP Fellowship

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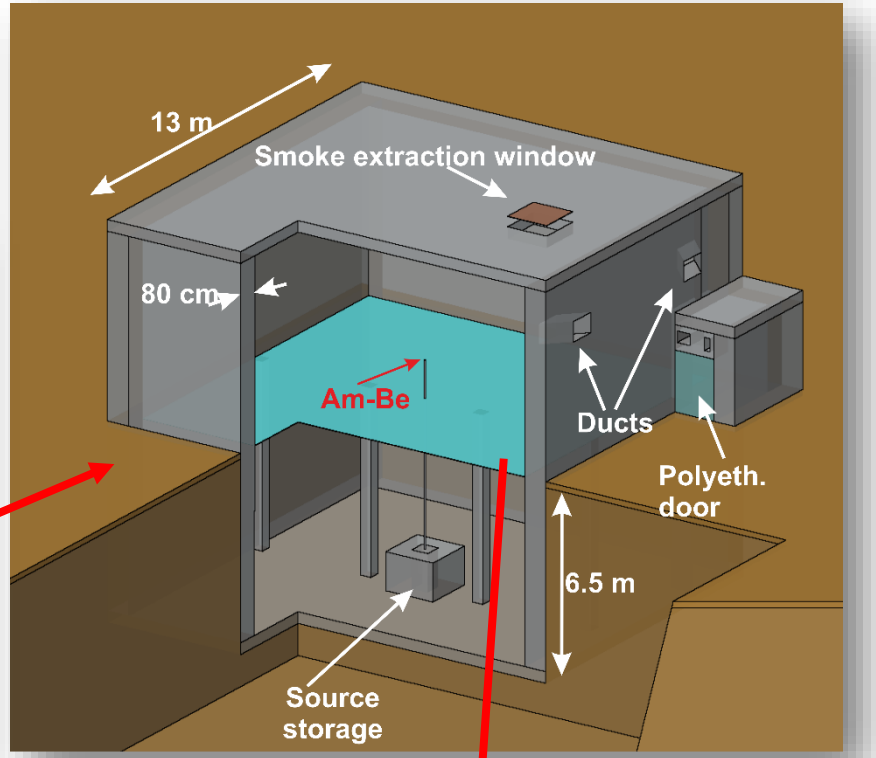
HSE-RP-DC and HSE-RP-SP

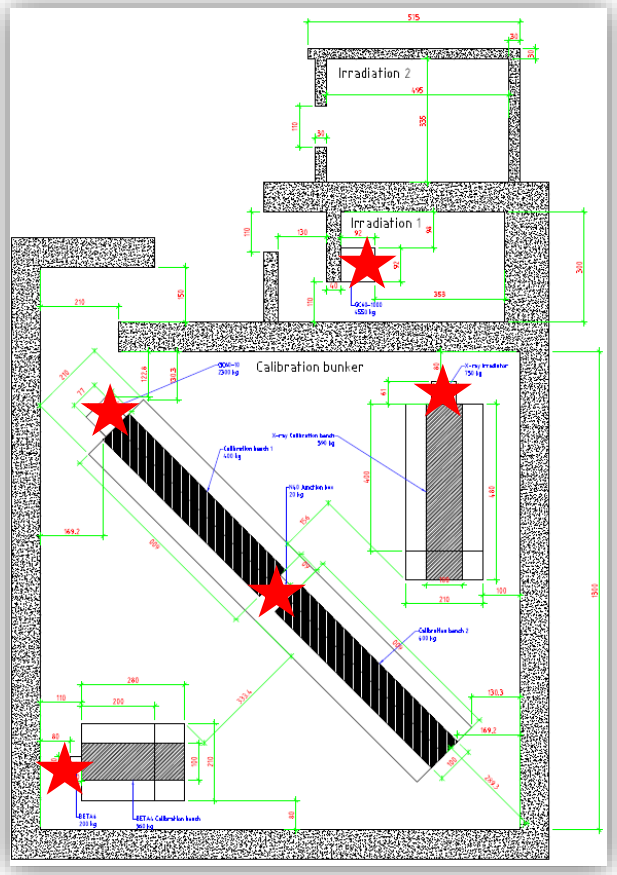
Table of ~~contents~~ acronyms

- CALLAB: **Cal**ibration **Lab**oratory
- CLEAR: **C**learance of **LE**P **A**cceleration **R**F System
- CERF: **C**ERN-**E**U high-energy **R**eference **F**ield facility

CALLAB: Building

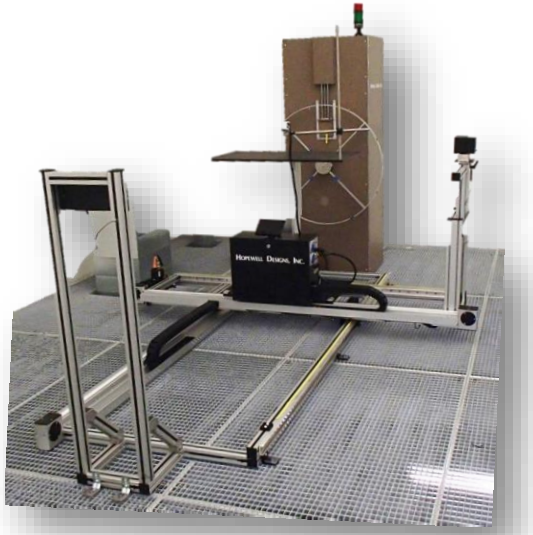


CALLAB: Capabilities



Cs-137: 1 µSv/h– ~200 mSv/h
Co-60: Sv/h and µSv/h

X-ray tube: 320 kV



Sr-90: 1.85 GBq
Kr-85: 4 GBq

Am-Be: 20 nSv/h - 1.4 mSv/h

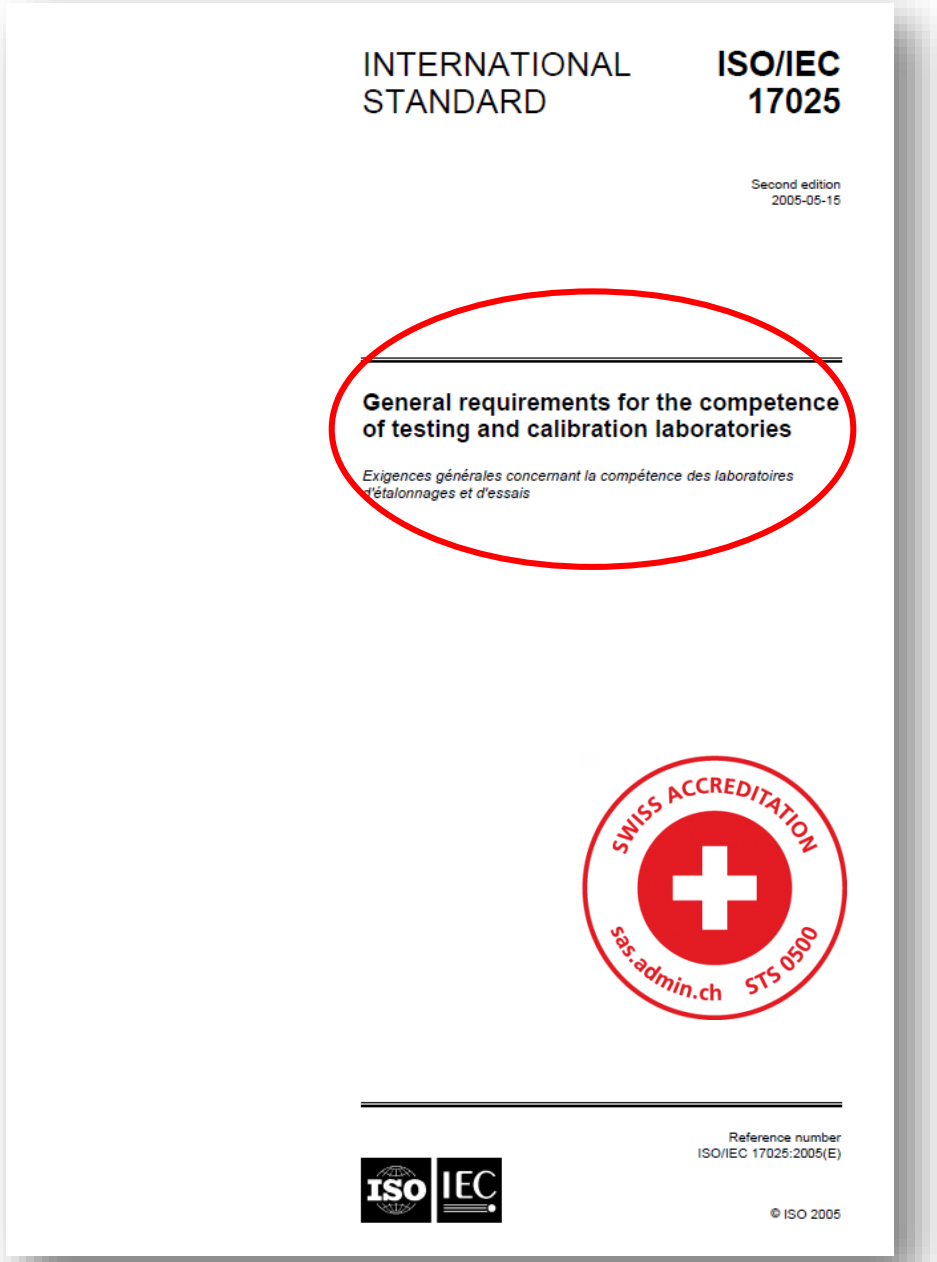
CALLAB: Accreditation 1/2

Objective: ISO 17025 accreditation
Reason: required by Swiss authorities

But first of all is an…

OPPORTUNITY to:

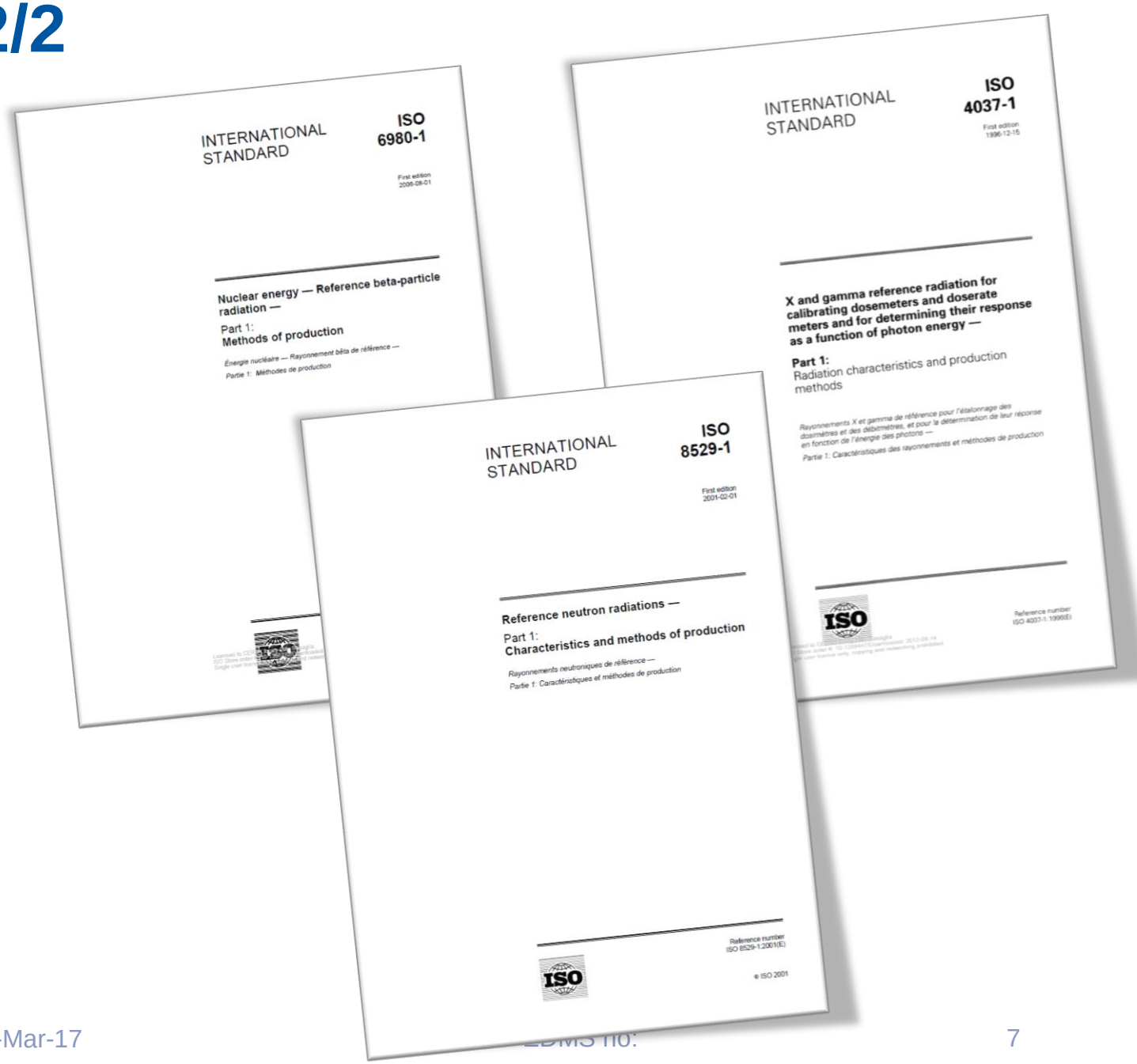
- **Provide** a reliable calibration service
- **Optimize** the calibration process
- **Identify** and prevent risks and errors
- …



CALLAB: Accreditation 2/2

How to obtain the accreditation:

- Quality manual (10-15 pages)
- Procedures (15 out of 25)
- Forms (3 out of 6)
- Working instructions (3 out of 26)
- Management committement
- Intercomparisons
- Audits
- …



CLEAR: overview

72 modules (68 pur Cu coated with a Nb fil, 4 pure Nb)

1 module sent to India

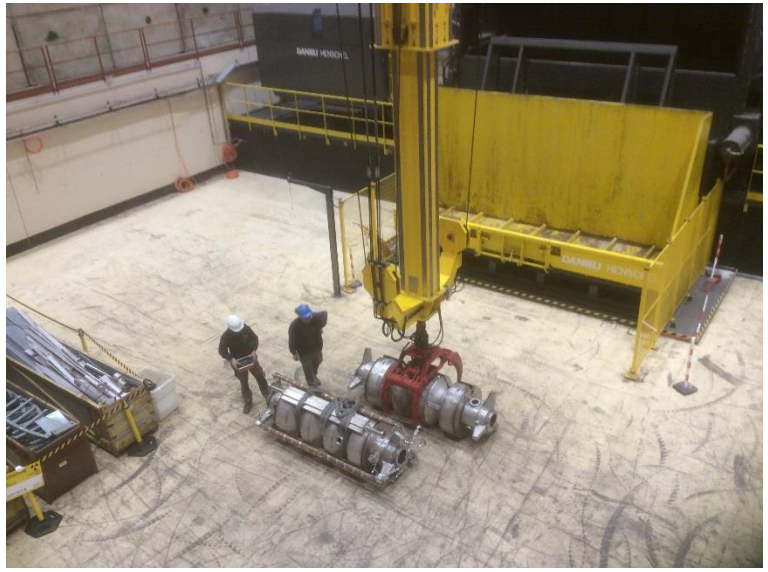
1 disassembled and pressed for test

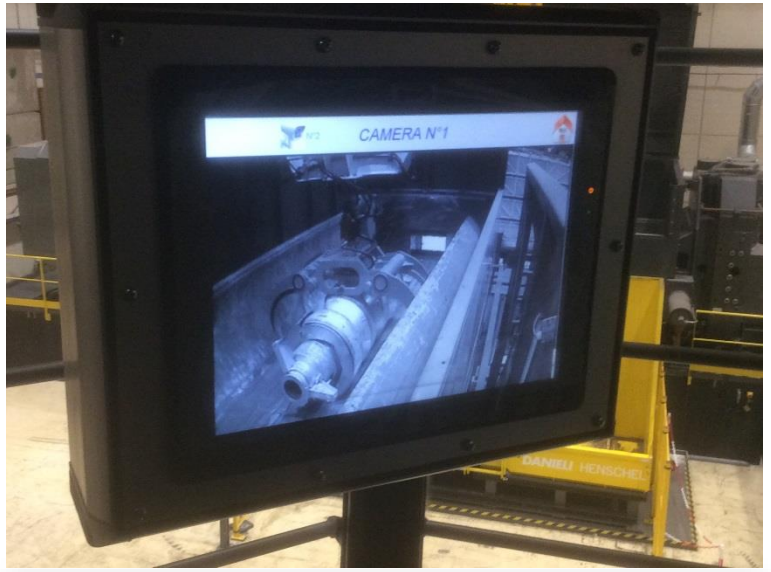
70 modules stored in ISR (2000 m^3)

Material	Weight
Al (tank)	134 tons
SS+Cu of the CM	95 tons
SS plates	22 tons
Ni rods	14 tons
Nb	3 tons
Iron supports	91 tons
Other (cables, small components, insulations…)	71 tons

CLEAR: options 1/2

1st option: classification as TFA (*très faiblement actif*) in France





CLEAR: options 2/2

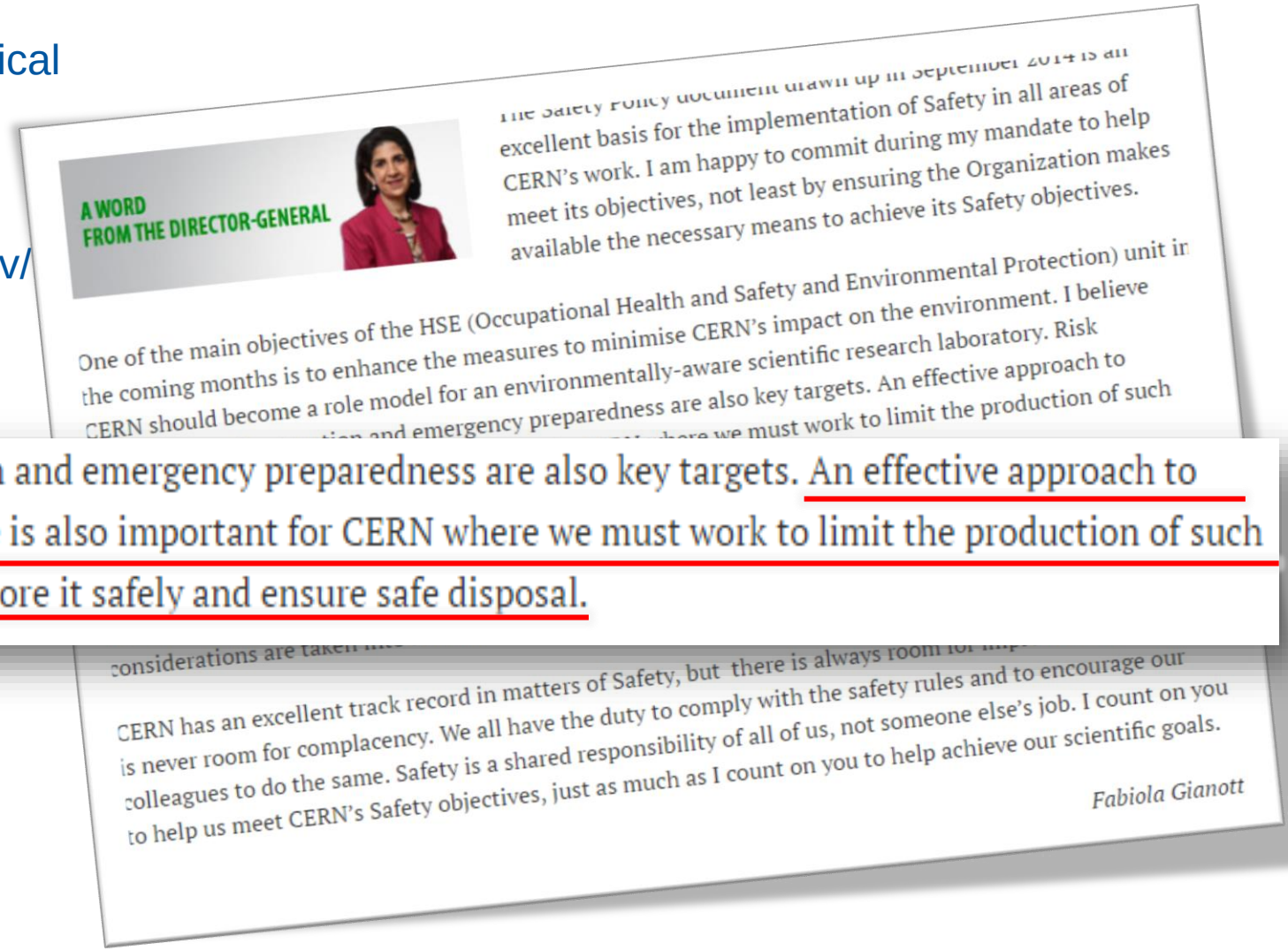
2nd option: clearance from regulatory control in Switzerland

Clearable if (see Swiss **ORaP**, Radiological Protection Ordinance):

1. **Surface contamination** < SC limits
2. **H*(10)** at 10 cm above background < 0.1 uSv/
3. **Specific activity** < LE limits

Why **clearance**?

- Conventional waste
- Recycling (impact on the environment)
- Cost-effective (income)



A WORD FROM THE DIRECTOR-GENERAL

excellent basis for the implementation of Safety in all areas of CERN's work. I am happy to commit during my mandate to help meet its objectives, not least by ensuring the Organization makes available the necessary means to achieve its Safety objectives.

One of the main objectives of the HSE (Occupational Health and Safety and Environmental Protection) unit in the coming months is to enhance the measures to minimise CERN's impact on the environment. I believe CERN should become a role model for an environmentally-aware scientific research laboratory. Risk assessment and prevention and emergency preparedness are also key targets. An effective approach to handling radioactive waste is also important for CERN where we must work to limit the production of such waste, sort it effectively, store it safely and ensure safe disposal.

considerations are taken

CERN has an excellent track record in matters of Safety, but there is always room for
is never room for complacency. We all have the duty to comply with the safety rules and to encourage our colleagues to do the same. Safety is a shared responsibility of all of us, not someone else's job. I count on you to help us meet CERN's Safety objectives, just as much as I count on you to help achieve our scientific goals.

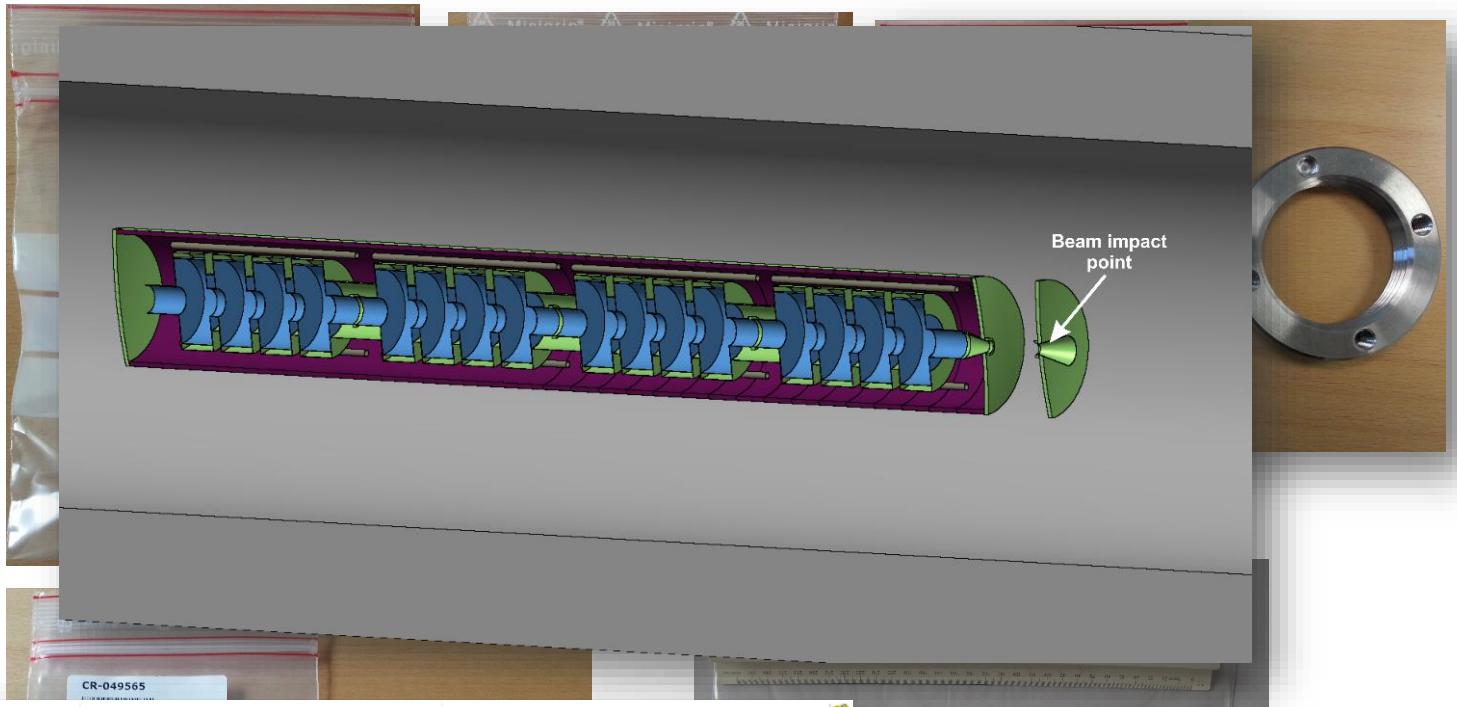
Fabiola Gianott

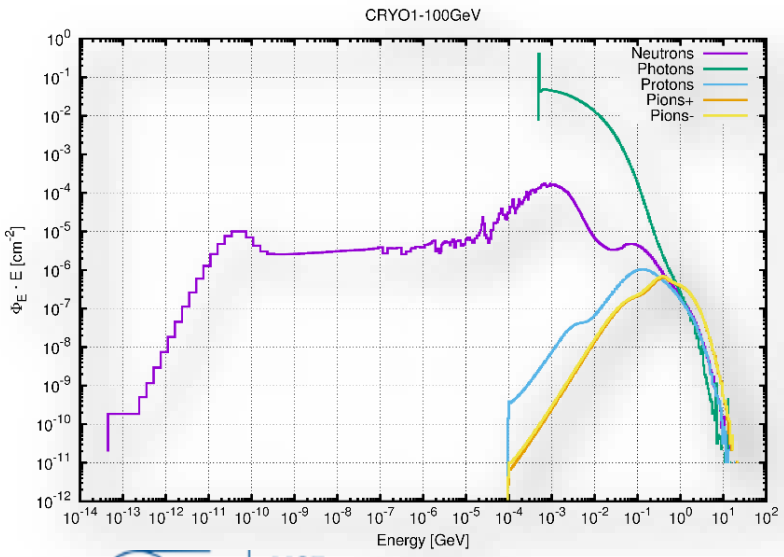
CLEAR project

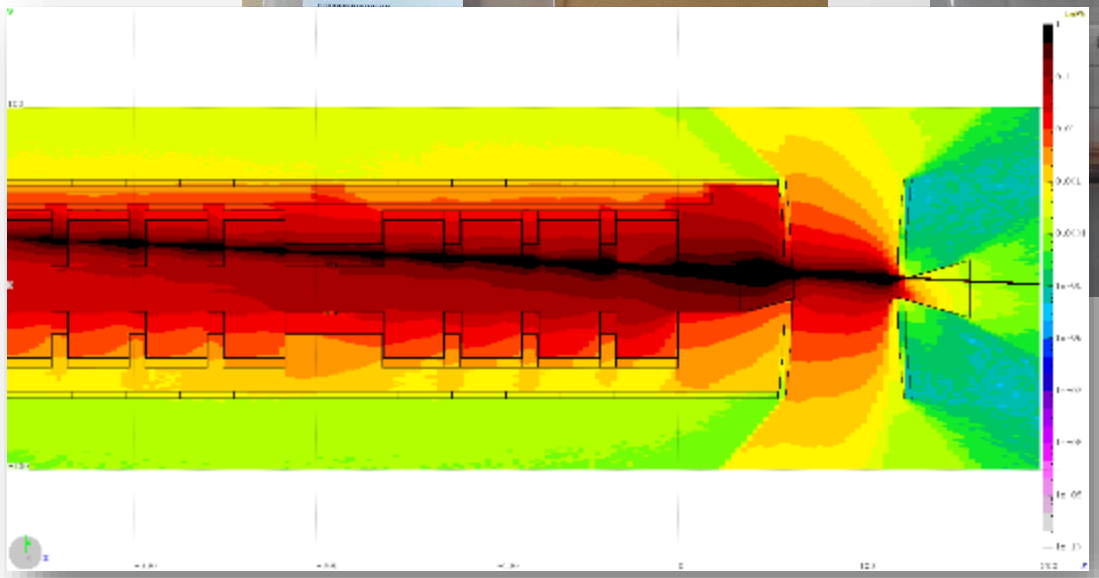
What clearance meant for CLEAR?

1. <u>Pre-characterization</u>:

- γ-spectrometry
- Radiochemical analyses
- FLUKA simulations
- ActiWiz calculations





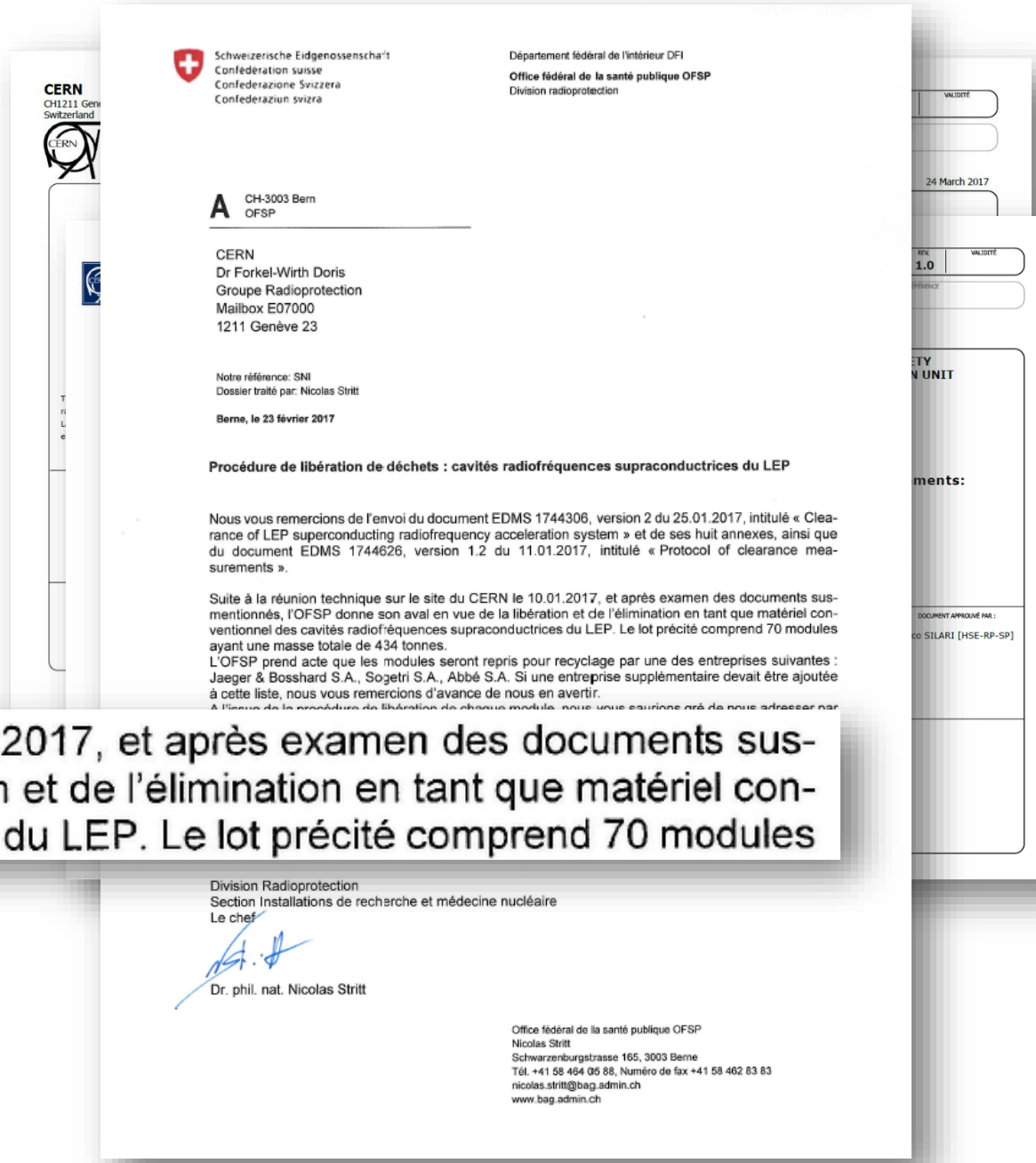


CLEAR project

What clearance meant for CLEAR?

2. <u>Strategy definition and OFSP approval</u>:

- Project charter
- Working instructions
- Report for OFSP
- Protocol template for clearance measurements



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

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1211 Genève 23

Notre référence: SNI
Dossier traité par: Nicolas Stritt

Berne, le 23 février 2017

Procédure de libération de déchets : cavités radiofréquences supraconductrices du LEP

Nous vous remercions de l'envoi du document EDMS 1744306, version 2 du 25.01.2017, intitulé « Clearance of LEP superconducting radiofrequency acceleration system » et de ses huit annexes, ainsi que du document EDMS 1744626, version 1.2 du 11.01.2017, intitulé « Protocol of clearance measurements ».

Suite à la réunion technique sur le site du CERN le 10.01.2017, et après examen des documents susmentionnés, l'OFSP donne son aval en vue de la libération et de l'élimination en tant que matériel conventionnel des cavités radiofréquences supraconductrices du LEP. Le lot précité comprend 70 modules ayant une masse totale de 434 tonnes.
L'OFSP prend acte que les modules seront repris pour recyclage par une des entreprises suivantes : Jaeger & Bosshard S.A., Sogetri S.A., Abbé S.A. Si une entreprise supplémentaire devait être ajoutée à cette liste, nous vous remercions d'avance de nous en avertir.

Division Radioprotection
Section Installations de recherche et médecine nucléaire
Le chef

Dr. phil. nat. Nicolas Stritt

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CLEAR project

What clearance meant for CLEAR?

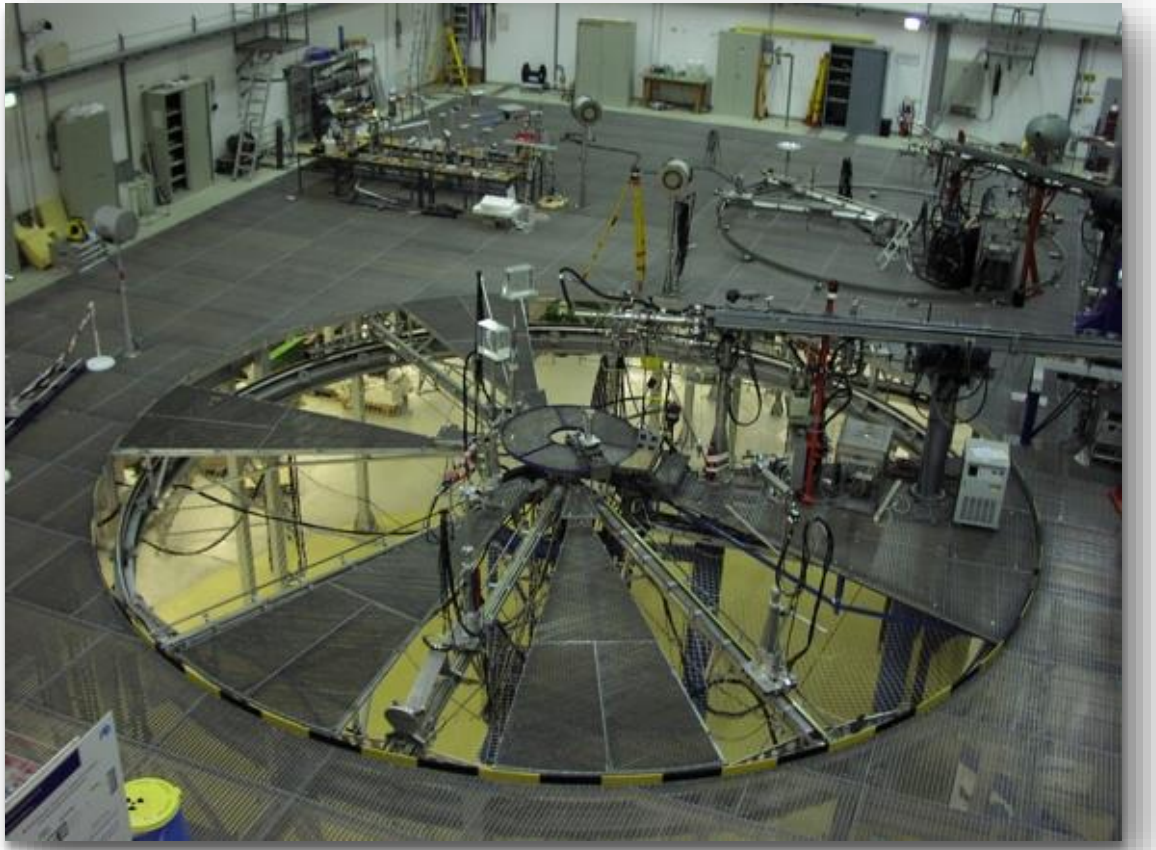
3. <u>Operational phase</u>:

a. Dismantling and sampling
b. Measurements
c. Fill in the clearance protocol
d. OFSP approval
e. Back to a)

CERF: Let me introduce

Reference fields from thermal up to about 1 GeV:

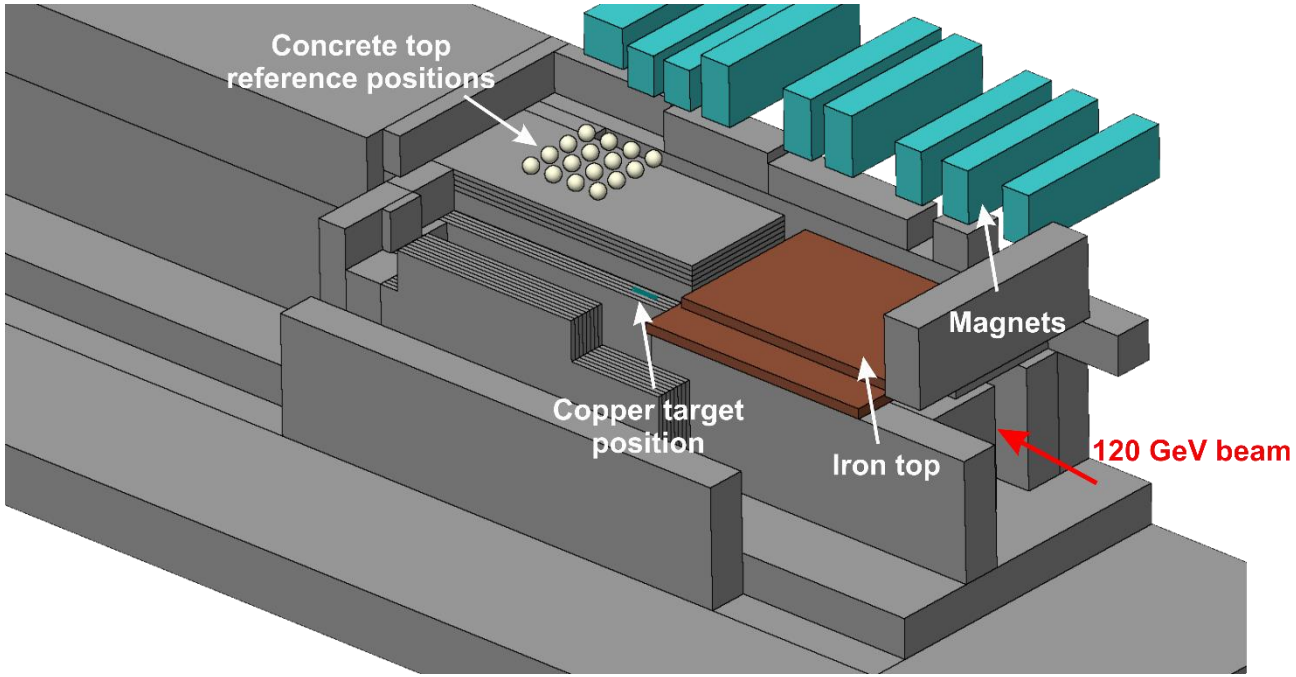
- **radionuclide sources**
- **thermal** and **filtered** neutron **beams** (nuclear reactors)
- nearly **monoenergetic fields** (particle accelerators)
- **simulated workplace fields**



HRN [Landshut (Munich - Germany)

CERF: Let me explain

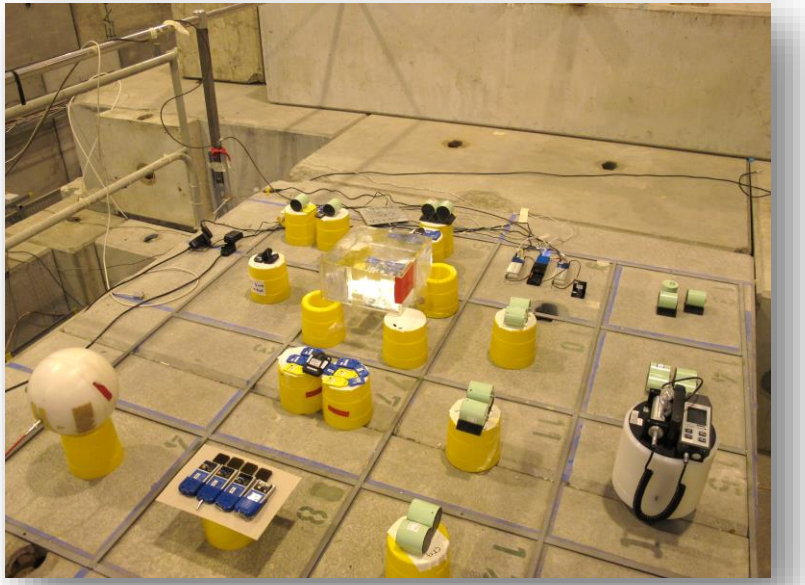
- '**Field calibration**' facility for radiation protection instrumentation used at high-energy accelerators
- '**Simulated workplace field**' to determine the response of detectors and dosimeters used around high-energy accelerators and for air-crew dosimetry
- **Several users** from universities, research centers, private companies and CERN

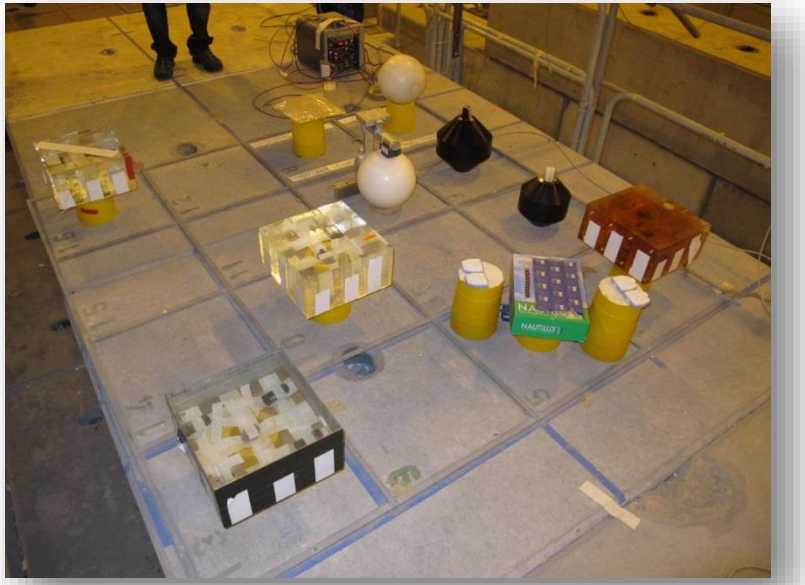


CERF: Applications 1/2

A wide range of instrumentation tested and inter-calibrated

- **Active monitors**: ionization chambers, GM counters, rem counters, TEPCs, Bonner Sphere Spectrometers, recombination chambers, silicon detectors, etc.
- **Passive dosimeters**: films, TLDs, nuclear track detectors, bubble detectors, etc.

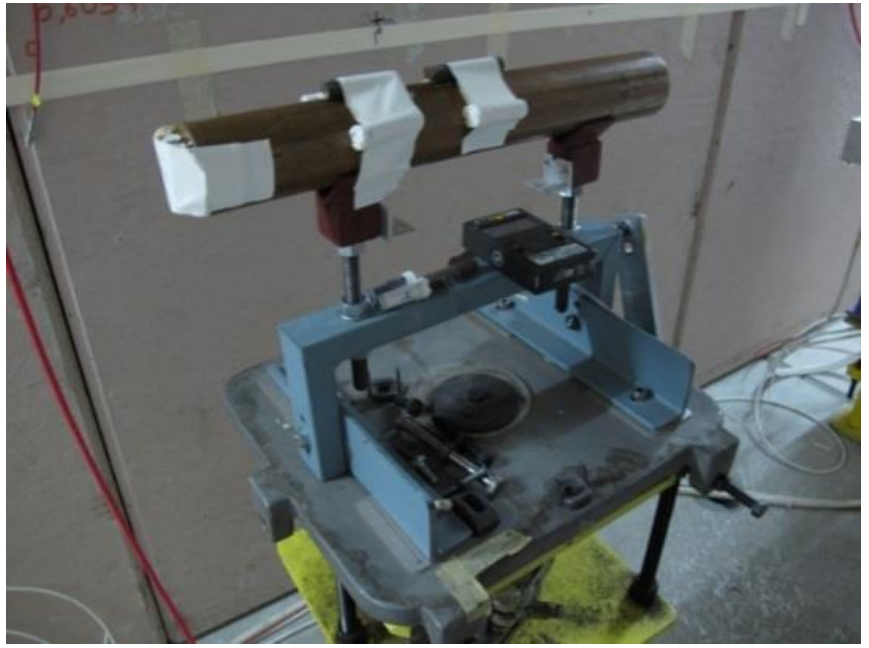




CERF: Applications 2/2

Other (non-instrument) applications:

- Spallation **cross-section** measurements
- **Activation** of accelerator materials
- Testing **computer memories**
- Test of prototype **beam loss monitor** for the LHC
- **Shielding** experiment
- …



Summary

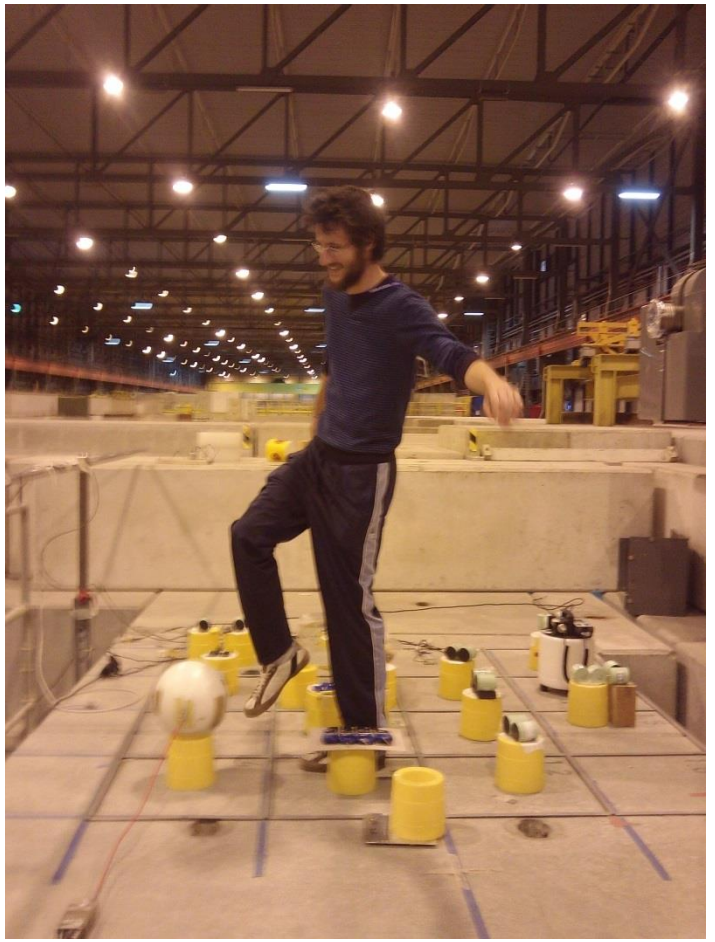
- **Radiation protection** is a **wide**, **interesting** and **demanding** domain

  but (sometimes) can be **funny**

- CALLAB **accreditation** important step towards **quality** in radiation protection

- CLEAR **key project** for CERN in view of **LS2**

- CERF important facility provided by CERN to the **scientific community**




CERN