
CERN
HSE
Occupational Health & Safety
and Environmental Protection unit

# TREC in experimental areas
# &
# Radiation Monitoring System in experimental areas

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03/05/2021
EDMS 2579972

# Content

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  - Possible sources of radiation alarms
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# Guidelines

- Every material **leaving a beamline** has to be **traced in TREC** and **controlled by RP**

- Every material **leaving a radiologically classified building** has to be **controlled by RP**

# Flow


- Identify the material (traceability stickers) **before** installing in the beamline. **Trace reasonably** (i.e. do not use one code per screw)
- Do the request **well in advance**, with indication of the time when the material will be available for the measurement (measurement deadline). Use comments in TREC if needed
- Deposit the material in the Buffer Zone, if possible. Otherwise, call the RP Officer (**Meyrin: 72504, Prévessin: 75252**)
- **Sign the EDH** created by TREC, and **wait for the RPO signature** before leaving the building
- **Update the location** of your equipment when it has been transported

# Layout of the areas – North Area

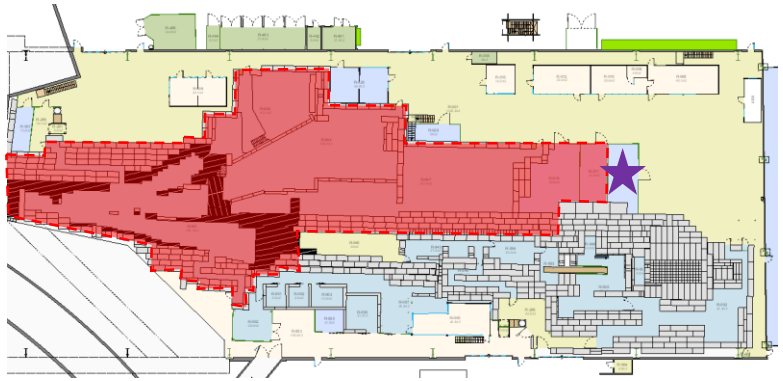
North Area

- 2 Buffer Zones available
- TREC mandatory for equipment in beam lines*

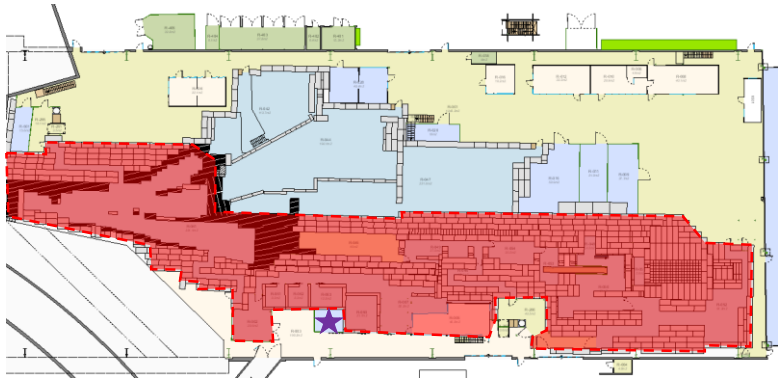
* As depicted by red areas

# Layout of the areas – East Area

- East Area
  - 1 Buffer Zone available
  - TREC mandatory for equipment in beam lines*



- CHARM/IRRAD
  - 1 Buffer Zone available
  - TREC mandatory for equipment in beam lines*

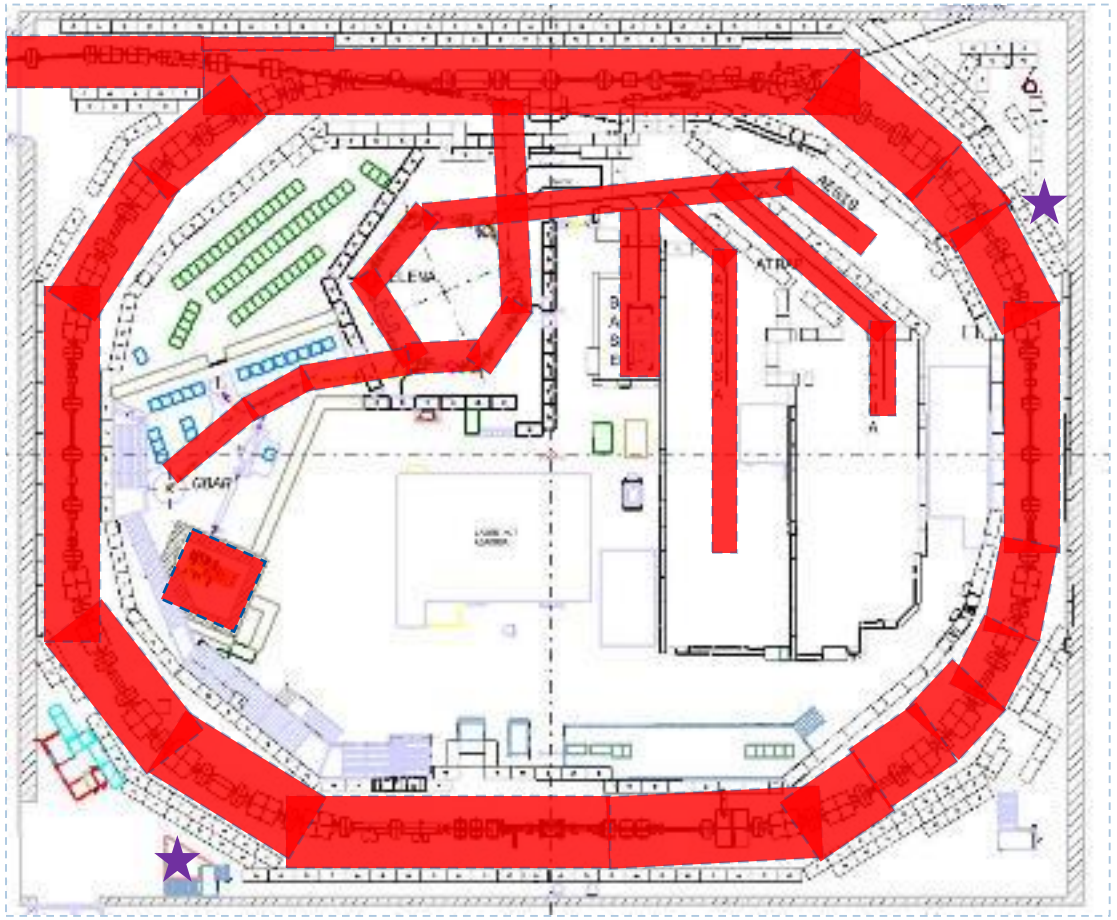


* As depicted by red areas

# Layout of the areas – AD Hall

AD Hall

- 2 Buffer Zones available
- TREC mandatory for equipment leaving AD ring*
- TREC mandatory for beam equipment and experimental setup*
- TREC not mandatory if 60 cm away from the beam line*. RP control still needed



* As depicted by red areas

# RP Contacts

- RP contact available at: https://espace.cern.ch/RP-LHC/DivDocs/RP-AS-Contacts-LastUpdate.pdf
- Do not hesitate to contact the RPO of the concerned area
- Meyrin: +41227**72504**
- Prévessin: +41227**75252**

***HSE-RP-AS (May 2021)*** Revision: 01/05/2021
***CONTACT PERSONS***

| | Responsible / studies | Operational RP |
|---|---|---|
| **LHC complex** | | |
| **LHC – accelerator** | Angelo Infantino<br>Heinz Vincke | Christophe Tromel<br>Angelito Herve |
| **LHC – experiments** | Robert Froeschl | Isabel Brunner<br>Christelle Saury |
| **SPS complex** | | |
| **SPS – accelerator, TI2/TI8** | Helmut Vincke | Angelito Herve<br>Florent Philippon<br>(Christophe Tromel) |
| **SPS – target areas** | Helmut Vincke | Yann Pira<br>Frederic Aberle |
| **AWAKE** | Claudia Ahdida | Christelle Saury<br>(Renaud Mouret) |
| **HiRadMat** | Helmut Vincke | Florent Philippon<br>(Angelito Herve) |
| **North experimental area** | Claudia Ahdida | Frederic Aberle,<br>Yann Pira |
| **PS Complex** | | |
| **Linac2, Linac3, LEIR** | Markus Widorski | Jean-Francois Gruber<br>(Mathieu Marcandella) |
| **Linac4** | Markus Widorski | Jean-Francois Gruber<br>(Mathieu Marcandella) |
| **PS Booster** | Fabio Pozzi | Mathieu Marcandella<br>Nadine Conan |
| **Isolde / Medicis** | Fabio Pozzi | Alexandre Dorsival<br>Elodie Aubert |
| **PS - accelerator** | Robert Froeschl | Nadine Conan<br>Jean-Francois Gruber |
| **East experimental area** | Arnaud Devienne<br>Robert Froeschl | Jean-Francois Gruber<br>Nadine Conan |
| **AD / GBAR** | Claudia Ahdida | Mathieu Marcandella<br>(Jean-Francois Gruber) |
| **n_TOF** | Fabio Pozzi | Jean-Francois Gruber<br>Nadine Conan<br>(Mathieu Marcandella) |
| **CTF3 / CLEAR** | Markus Widorski | Mathieu Marcandella |

(Names) in parenthesis are responsible only during absence periods

***HSE-RP-AS (May 2021)*** Revision: 01/05/2021
***CONTACT PERSONS***

| | Responsible / studies | Operational RP |
|---|---|---|
| **Other sites and facilities** | | |
| **LIGHT** | Markus Widorski | Renaud Mouret<br>(Isabel Brunner) |
| **Radioactive workshops** | Markus Widorski | Angelito Herve (PREVESSIN)<br>Yann Pira (PREVESSIN)<br>Nadine Conan (MEYRIN) |
| **Radioactive storage** | | Yann Pira (PREVESSIN)<br>Frederic Aberle (PREVESSIN)<br>Jean-Francois Gruber (MEYRIN) |
| **Operational dosimetry** | Frederic Aberle | Jean-Francois Gruber (MEYRIN)<br>Christophe Tromel (PREVESSIN) |
| **Portiques** | Markus Widorski | Didier Alberto (PREVESSIN)<br>Jean-Francois Gruber (MEYRIN) |
| **RF tests areas (SM18, XBOX)** | Markus Widorski | Florent Philippon<br>Renaud Mouret |

Central contact: PS complex 72504, SPS/LHC complexes 75252

| | | | |
|---|---|---|---|
| Frederic Aberle | 161607 | Angelito Herve | 163168 |
| Claudia Ahdida | 164145 | Angelo Infantino | 165173 |
| Didier Alberto | 160649 | Mathieu Marcandella | 168926 |
| Elodie Aubert | 169097 | Renaud Mouret | 166612 |
| Isabel Brunner | 164401 | Yann Pira | 166071 |
| Nadine Conan | 160641 | Florent Philippon | 167992 |
| Arnaud Devienne | 165550 | Fabio Pozzi | 166258 |
| Alexandre Dorsival | 164834 | Christelle Saury | 162238 |
| Safouane El Idrissi | 168638 | Christophe Tromel | 163199 |
| Robert Froeschl | 160058 | Heinz Vincke | 165456 |
| Rafik Goucem | 163501 | Helmut Vincke | 163701 |
| Jean-Francois Gruber | 169144 | Markus Widorski | 163758 |

(Names) in parenthesis are responsible only during absence periods

# Reminders (often forgotten)

- The TREC code follows the equipment part until the end of his life
- Record your request in TREC
- Indicate a responsible person who is at CERN and available to sign in EDH
- Sign your EDH
- Wait until RPO signature before leaving
- In case of urgency, contact the RPO
- For specific cases, contact the RPO

# *Questions?*

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  - **Q&A**

# Radiation monitoring system

- Radiation monitoring system
  - ensures that radiation levels are compliant with the Radiological Area Classification
  - detect (and, if needed, terminate) degraded operation conditions
- Ambient dose equivalent rate averaged over a predefined time window
  - Typical time window length ≥ 90s (~2 PS super-cycles)
- Two alarm thresholds
  - Alert → visible and audible alert and sent to CCC
  - Alarm → visible and audible alarm and sent to CCC + interlock beam
- The actual alarm threshold settings are derived from the Radiological Area Classification Limits
  - Supervised Radiation Area – Low Occupancy: 15/30 µSv/h
  - Supervised Radiation Area – Permanent Workplace: 3/6 µSv/h

# Radiation monitoring system in EHN1

- In EHN1, the system primarily monitors prompt radiation
- Alarm acts on the corresponding safety chain automatically
- This removes the source of the prompt radiation
- Exception: radiation monitor on roof of H6-CERF (muons from upstream areas)
- Radiation monitoring system in EHN1 has been upgraded from ARCON to CROME in LS2

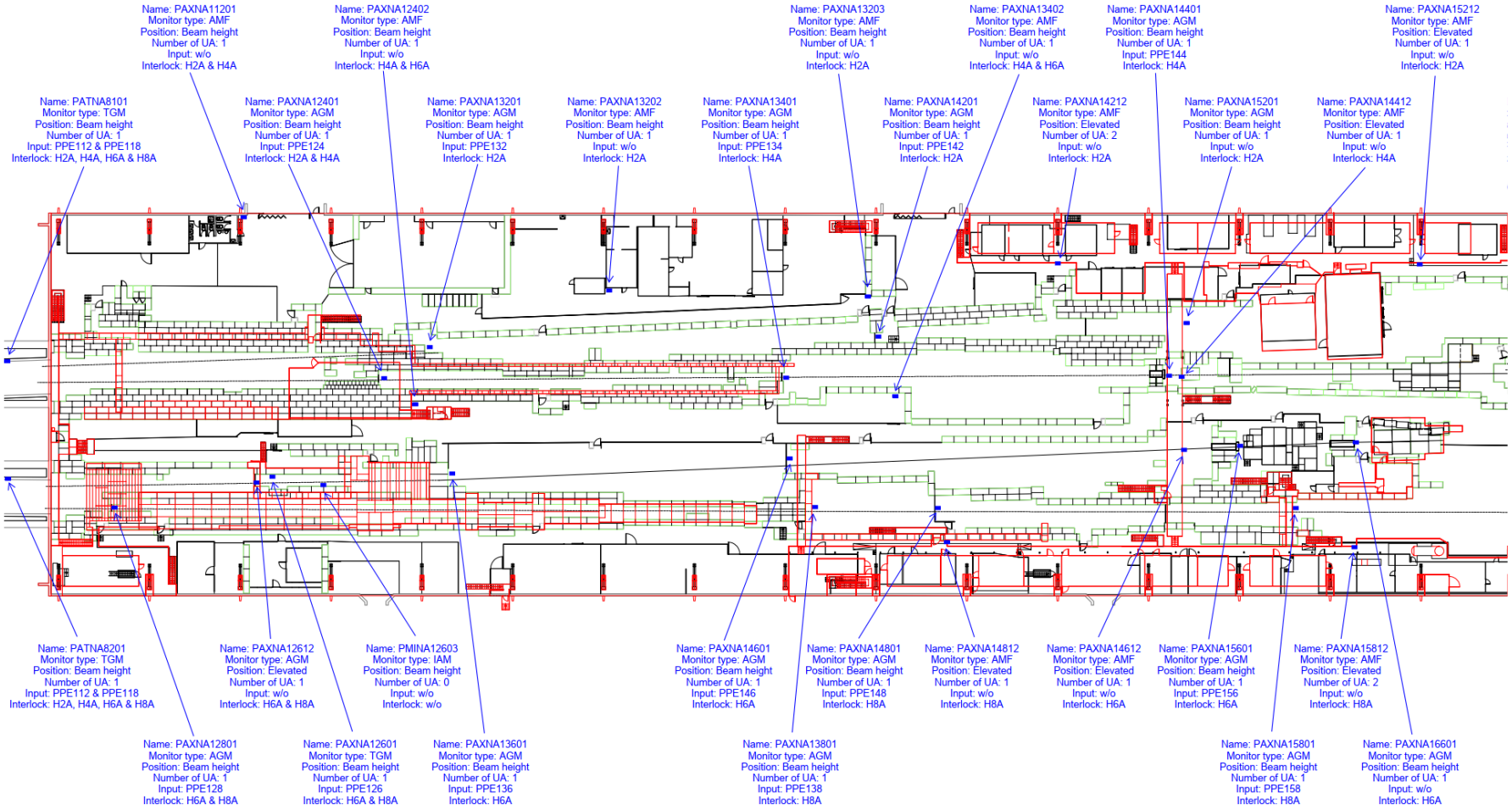
# Radiation alarm displays

**Flashing RED light + Audible ALARM**
**→ Leave the concerned area calmly**

**Flashing ORANGE light + WARNING SOUND**
**→ Limit your stay in the concerned area**

**Continuous green light = NORMAL situation**
**(low radiation levels, system OK)**


# Radiation monitoring system in EHN1



# Possible sources of EHN1 radiation alarms

- Beam transport and steering
  - In the NA Target area
  - In the transfer lines upstream and around EHN1
  - In the beam lines in EHN1
- Beam intensity
  - **Collimator settings** are a major source of alerts/alarms
- Beam particle type
- Status of beam intercepting devices
  - Including their surrounding

# Recommended actions in case of radiation alarms in EHN1

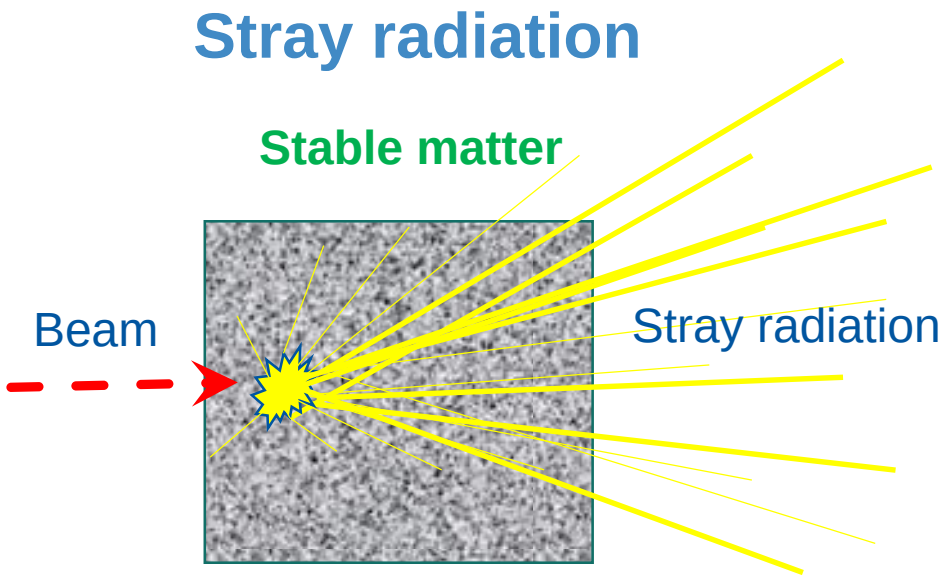
- In case of **any alarm** in a zone under your responsibility
  - **Understand & remove the source of the alarm**
  - CCC, beam line physicists, radiation monitoring data
- EHN1 is a very large building
  - You can safely stay in EHN1 if there is no radiation alarm in your vicinity
  - In case of doubt, please contact the responsible of the zone where the alarm occurs (via the CCC)

# *Questions?*

# Radiation at CERN

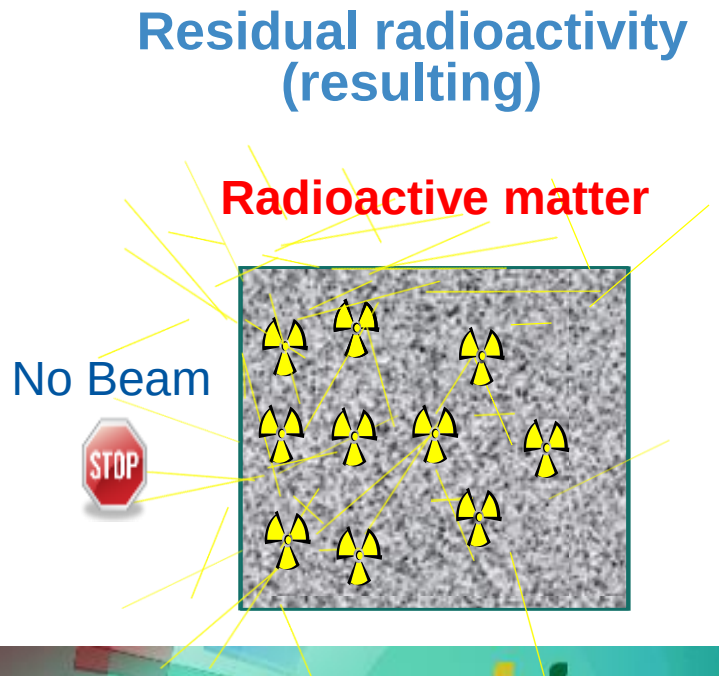
## Accelerator in operation:

The interaction beam-matter generates stray radiaton

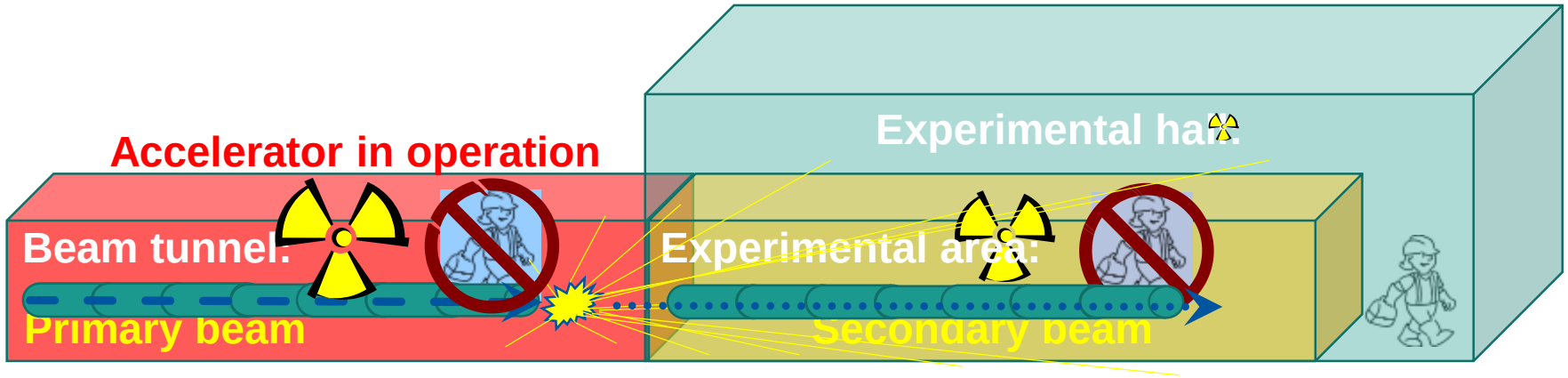



## Accelerator stopped:

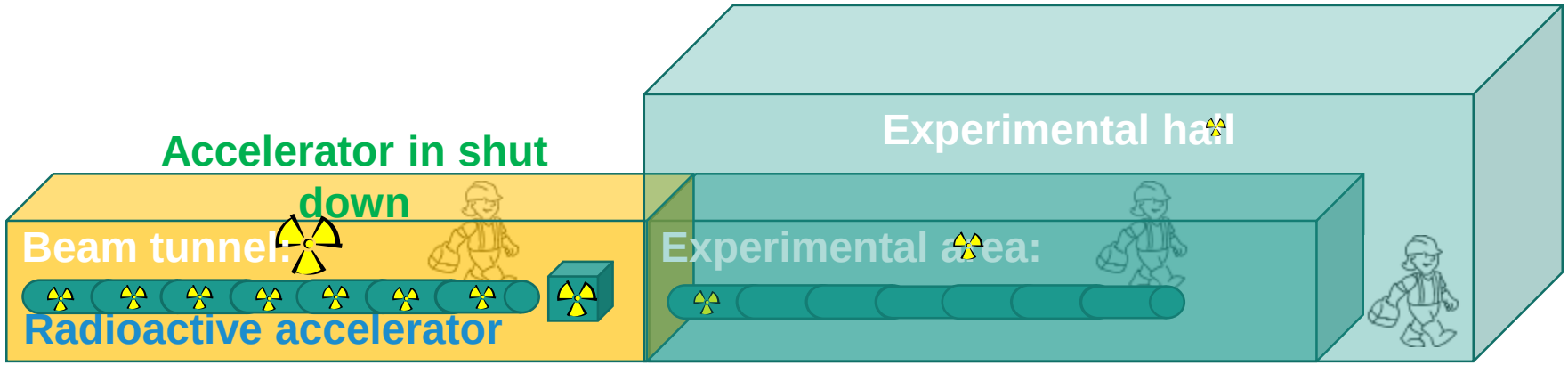
The interaction beam-matter has made the matter radioactive (activation)



# Ionising radiation in/around the accelerators



# Ionising radiation in/around the accelerators

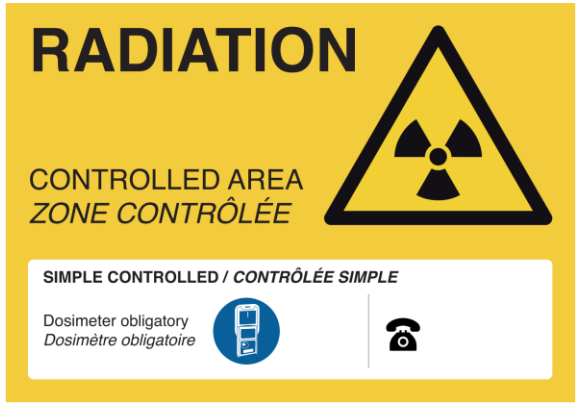


# Radiation Areas at CERN

Areas with risks due to ionizing radiation are classified as "Radiation Areas". Radiation Areas at CERN are clearly marked with yellow panels. Corresponding to the risk level, Radiation Areas are subdivided into:

"Supervised Radiation Areas“
(<15 µSv/h - low risks)


"Controlled Radiation Areas“
(elevated risks)




EHN1 is generally a Supervised Radiation Area due to prompt radiation levels