

# Radioactive Beam Sources (RBS) activities

**89<sup>th</sup> ISOLDE Collaboration Committee meeting  
5<sup>th</sup> of November 2020**

Joachim Vollaire on behalf of EN-STI



ENGINEERING  
DEPARTMENT

# Outline

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- Status of frontends replacement and commissioning
- Status of the new Fast Tape Station
- Nano-Laboratory construction and actinide target production
- TISD team and target production
- Looking after Long Shutdown 2

# FE10 status (Frontend for GPS)

- FE10 was transported inside Building 179 before the spring lockdown (before civil engineering work for the building extension)
- Remaining minor mechanical work and additional tests were conducted before the FE10 transport into the target area end of July

FE10 completion in Build. 179



Frontend delivery team (with masks)

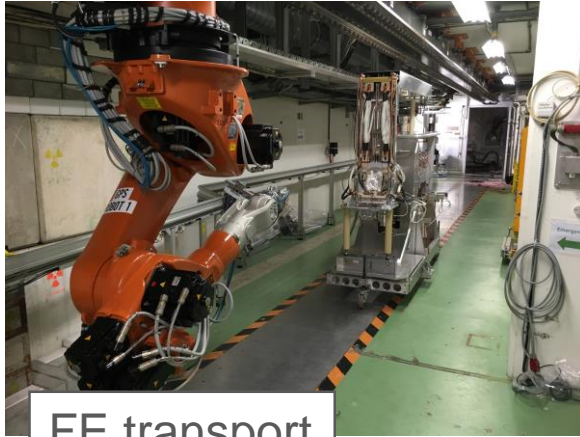


Passing the chicane

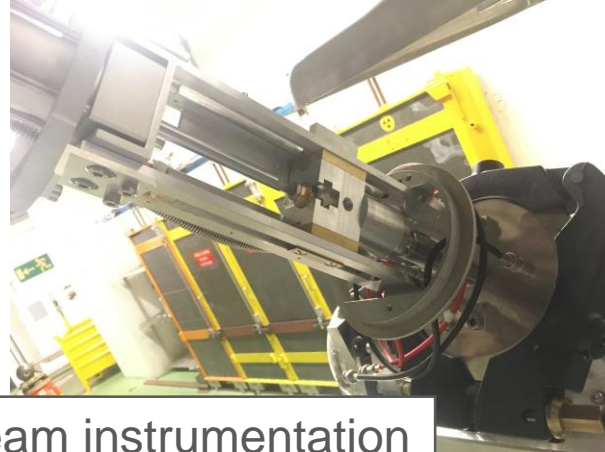




# FE10 production status (installation on GPS)

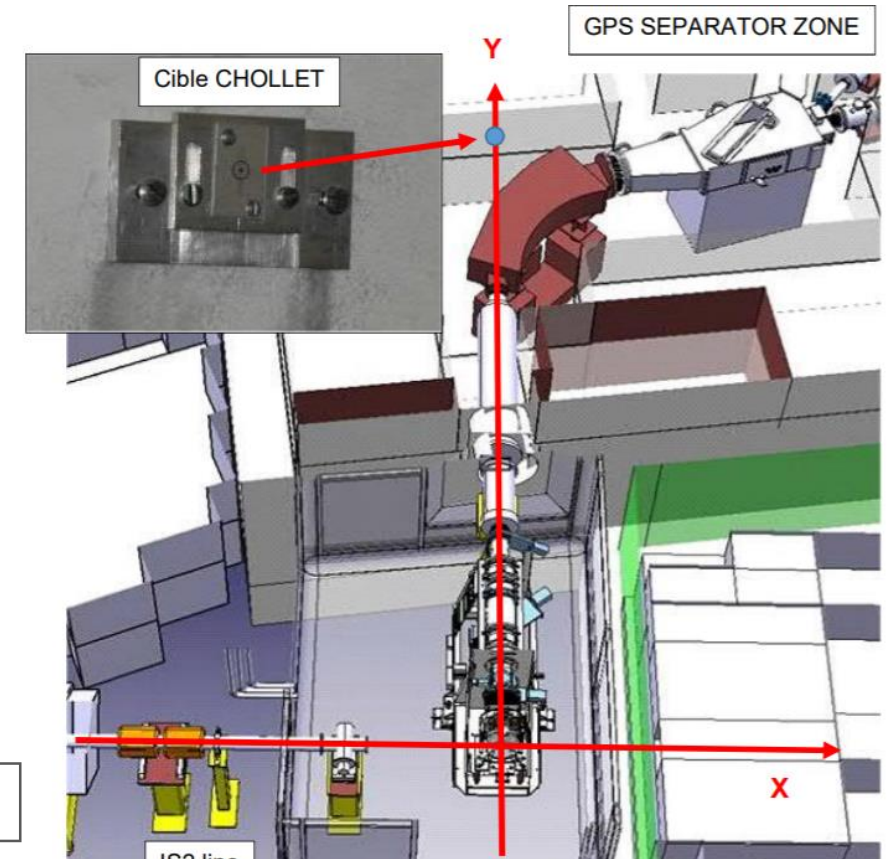


FE transport



Beam instrumentation

Alignment work (well documented)



FE connection and services



New irradiation table

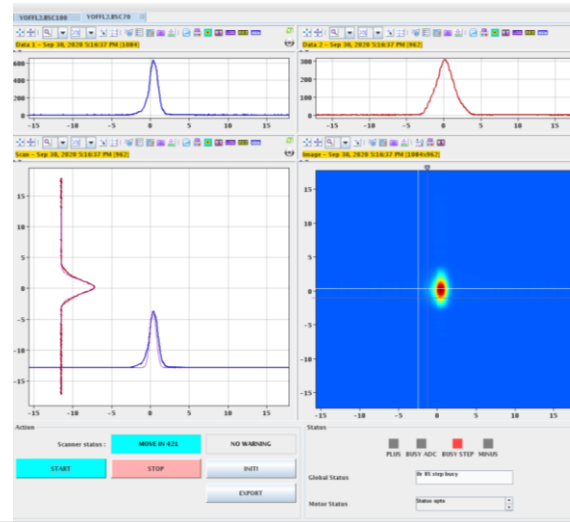
# FE10 production status (installation on GPS)

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- Stable beam tests are ongoing since a few weeks (EN-STI-RBS and BE-OP-ISO)
- FE10 beam used for the commissioning of the low energy beam lines
- Two remaining interventions are necessary:
  - Install cover between the Boris tube and FE (HV limitation to 30 kV)
  - Regulation of beam instrumentation movement
- Produce, test and deploy the new gas system to inject gas into the ISOLDE target (temporary system for first tests already in place)



# FE11 status (Frontend for HRS)



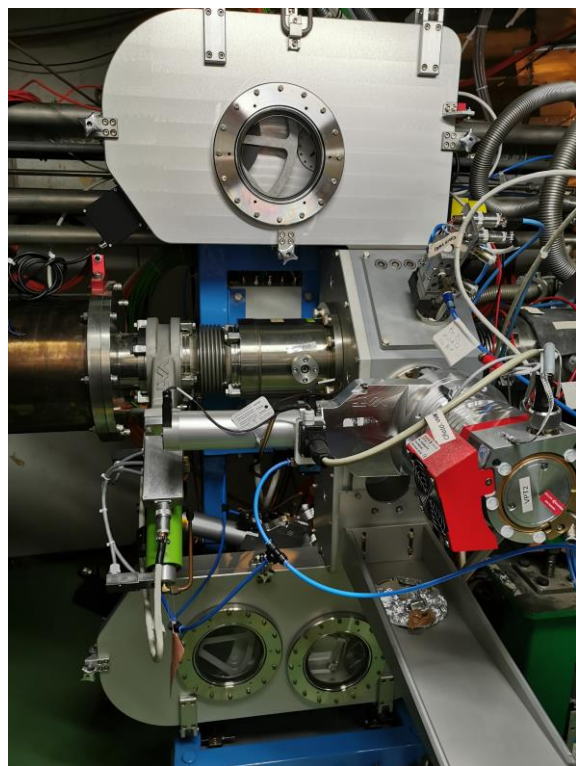
- Mechanical assembly and connection at offline2 have been performed over the summer
- Beam tests are ongoing since a month and will be finalized during the coming days
- The FE11 will be transported to the target area next week
- Readiness for beam tests expected in December (but limited time will be available before the cooling water stop)

# Outline

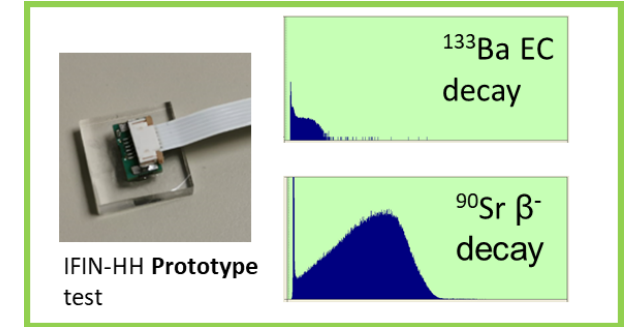
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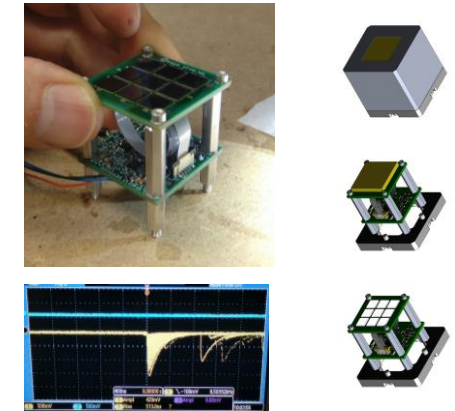
# The New Tape Station (the “eyes and ears”)



- **Vacuum:** tested final location (CA0)
- **Beam instrumentation and low level control:**
  - Tape control and counter readout tested (on FESA level)
  - Beam scanner to be installed by BE-BI
- **Beta detectors:**
  - 3x3 SiPM array tested at IFIN-HH, same design can be used for all the detectors ( $2\pi$ ,  $4\pi$ ,  $\beta$ - $\gamma$ ). To be shipped soon to ISOLDE.
  - New plastic scintillators made at CERN (3 and 5 mm thick).
  - New amplifier design for the old detectors, as backup solution
- **HPGe detector:**
  - Repair finished, final tests at GSI – to be shipped soon.
- **Data acquisition:**
  - Testing CAEN DT5725 as a possible all-in-one solution
- **Top level Controls (GUI)**
  - Basic version by BE-OP (Java)
  - Expert interface via STI-RBS (tbd)
- **Future**
  - Currently investigating adding  $\beta$  and  $\alpha$  detectors at the 2nd and 3rd measurement positions
  - Once TS1 ready launching TS2 installation



IFIN-HH 3x3 SiPM array (final)



New amplifier for old detectors (ISOLDE)

**DT5725**

8 Channel 14-bit 250 MS/s Digitizer





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# Nano-Laboratory Construction

**March**

**June**

**November**



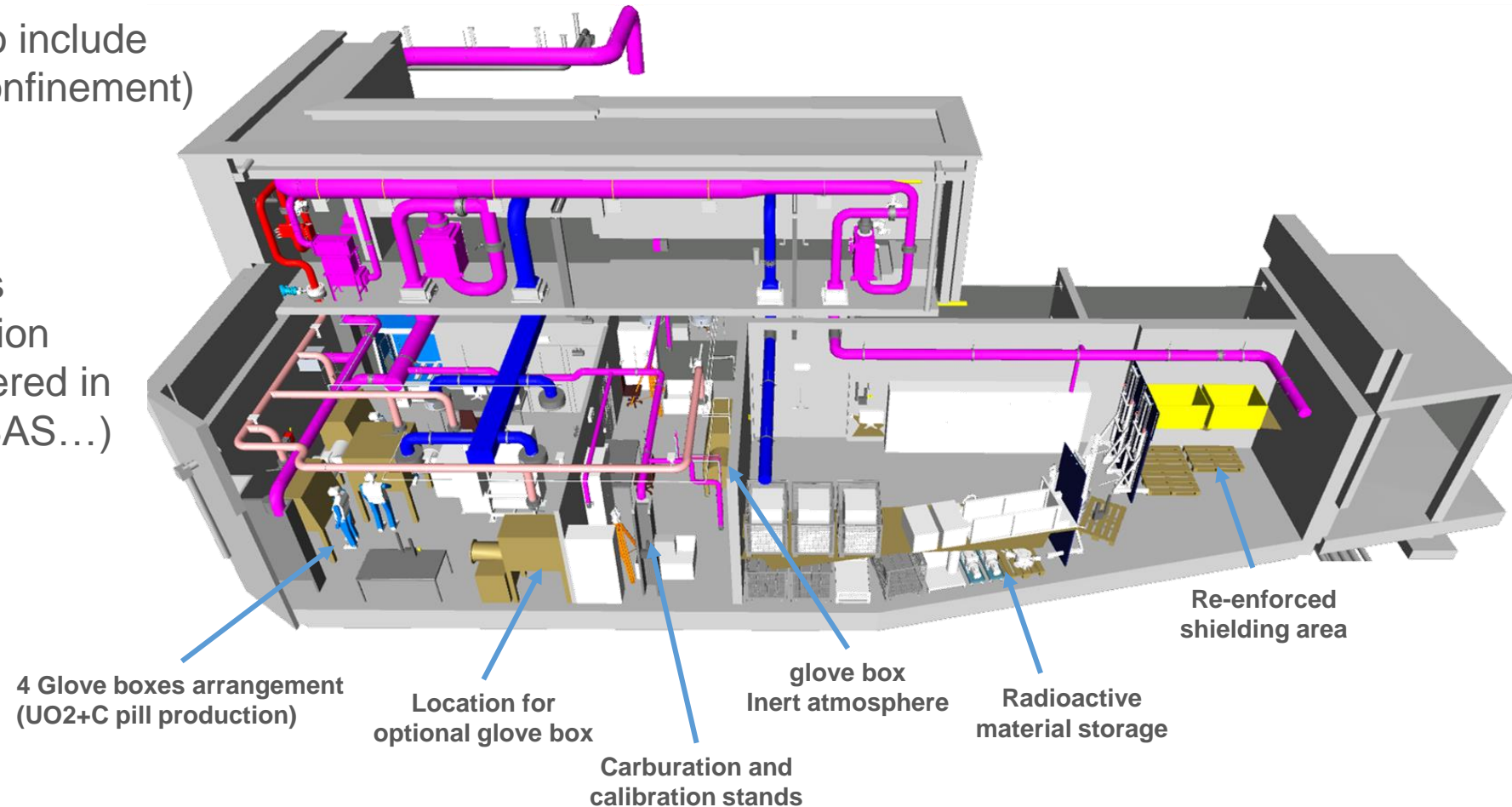
**Existing Building 179**

- New laboratory will offer more space and a modern infrastructure (fully enclosed process requiring less transfer of radioactive powder) for production of UCx pills (including pills from nano-material powders)
- Storage area for radioactive material (hot cell for ISOLDE and MEDICIS targets dismantling)

# Nano-Laboratory Integration

- Nuclear ventilation expanded to include the new laboratory (dynamic confinement) impact activities → in 2021
- Fully enclosed process:
  - 4+1+1 glove boxes
  - Enclosure of new pill-press
  - Dedicated process ventilation
- Nano-material handling considered in building specification (access SAS...)

Current actinide targets production laboratory





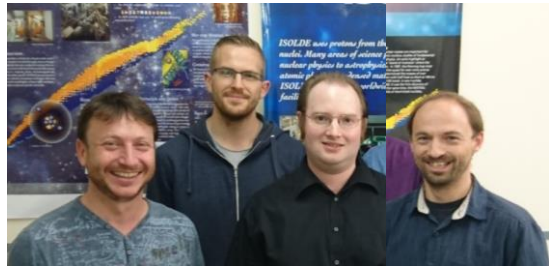
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# The ISOLDE target team: prepared for RUN3

Pre-pandemic picture



T. Stora D.Leimbach J.Ballof **S. Rothe**

STAF DOCT Phd, FELL STAF

Q4.2019



R. Heinke

VISC

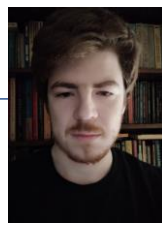
APR



Y. Gracia

FTEC

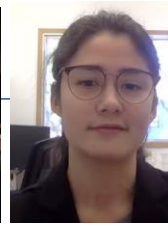
JUL



E. Reis

FTEC

SEP



M. Au

Phd, FELL

SEP



M. Bissell

PJAS (50%)

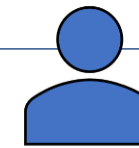
NOV



S. Stegemann

FELL

Q1.21



t.b.d.

DOCT

- Negative ion sources and physics with negative beams
- Molecular refractory beams
- LIST ion source (jointly with RILIS)
- Gas systems and Carburization process
- UC nano process development
- Molecular actinide beams (LISA network)
- ISCOOL, Tapestation
- General target material development
- Bottom-up nanomaterials (DOCT project accepted)

# Targets for 2021 and development

Production of actinide targets for 2021 run  
Upgrade of Laboratory nuclear ventilation (first months of 2021)

Production of storage container



5 Targets produced

708-UC-MK1	713-UC-VD5
709-UC-MK1	714-UC-VD7
710-UC-MK1	715-UC-MK1
711-UC-MK1	716-UC-MK1
712-UC-MK1	717-UC-MK1



B. Crepieux, M. Owen, S. Rothe

## TARGET LIFECYCLE

Nano-material tests  
and production  
process tests



Cold tests of target  
dismantling





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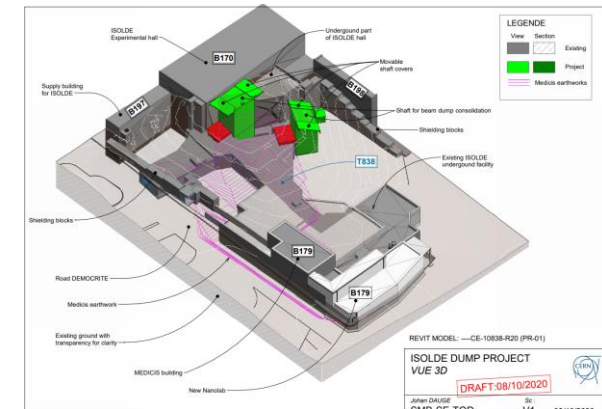
# ISOLDE Beam Dump Replacement Study

## IBDRS Isolde Beam Dump Replacement Study

### Roadmap



- Ana-Paula Bernardes nominated Project Leader
- One fellow started in October



- New beam dump system compliant with modern standard for operation and RP
- Opportunity to implement solutions to overcome some current limitations (space, accessibility, intensity, energy...)

# Conclusions

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- Since June (last ISCC and ramp-up of activities after the lockdown) priority has been the finalization of LS2 work (Frontends) and readiness for 2021 run (Fast Tape Station and target production). Activities on site continue (05/11/2020), TLW whenever possible.
- Excellent progress with nano-laboratory construction and equipment procurement for new (nano) processes (glove boxes, fume cupboard, carburization stands...)
- TISD team staffing ramped-up to support development and next year run
- Very rich MEDICIS run since June using external sources (Sm-153, Tm-167, Tb-155 and Ac-225)
- ISBDRS project (funded) being launched to study the replacement of the ISOLDE beam dumps (project structure in pace and deliverables defined)
- ISOLDE Instantaneous Beam Sharing also considered as shorter term upgrade (request for Swedish Research Council grant)



# Thank you for your attention!



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