Collaboration Board – Short Report

TESLA Technology Collaboration Meeting

4 - 7th February 2020

TTC Meeting Scientific Program Committee:

Hans Weise (DESY), TTC Chair
Frank Gerigk (CERN), LOC Chair
Sergey Belomestnykh (FNAL), Eiji Kako (KEK),
Robert Laxdal (TRIUMF), Wolf-Dietrich Moeller (DESY),
Paolo Pierini (ESS), Akira Yamamoto (KEK/CERN)

Hosted by CERN

Geneva, Switzerland
https://indico.cern.ch/e/TTC2020

CERN

TESLA TECHNOLOGY TTC COLLABORATION

Hans Weise, DESY

February 7th, 2020

The mission of the TESLA Technology Collaboration

The mission of the TESLA Technology Collaboration is

- to **advance SRF technology R&D and related accelerator studies** across the broad diversity of scientific applications, and
- to keep open and provide a **bridge for communication and sharing of ideas, developments, and testing** across associated projects.

To this end the Collaboration supports and encourages **free and open exchange of scientific and technical knowledge, expertise, engineering designs, and equipment.**

The TTC organizes regular collaboration meetings where new developments are reported, recent findings are discussed and technical issues are concluded. This time, TTC meeting is hosted by CERN on 04 - 07 February 2020.

Agenda

- Approval of the **minutes of the Vancouver CB meeting**
- **Short Reports on TTC WGs** and esp. topical meetings
- The **procedure for selecting the TTC Chair** was meanwhile documented with the help of the chair of the last selection procedure. The CB and its Chair will act accordingly. The next selection process requires CB actions in summer 2020.
- We appreciated the application of **QST/Rokkasho** for TTC Membership. Keitaro Kondo-san described the lab in a short presentation. There was unanimous agreement during voting. **We welcome QST / Rokkasho.**
- **Rokkasho was picked as the TTC Workshop host for summer 2020.** We confirmed the meeting in Aomori, Japan, June 30 til July 3, 2020.
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Short Reports on TTC WGs and esp. topical meetings

- High Q / High G – Ari summarized the progress since the last meeting – in general the working group is useful but more engagement from labs outside the USA would make the WG more effective. JLAB and FNAL are the most active presently.

- Thin films – there was a discussion on whether we need to specifically promote this technology since it is already a conference series – Frank Gerigk will reinitialize a call for a TTC lead communication forum to gauge the interest.

- Topical meetings
  - ► LLRF – this is already covered under the LLRF global series
  - ► Cornell is hosting a Nb3Sn topical workshop in early 2020 – we will aim for a report at the next TTC
  - ► TTC Topical Workshop on SRF Linac Operation, Experience and Improvements

TTC Topical Workshop on SRF Linac Operation, Experience and Improvements

Early November, 2020 – hosted by Jefferson Lab, Newport News, VA, USA - Duration: Three days

Objective

- Bring operational experts, scientists and engineers together to discuss existing issues with installed SRF linacs. Characterize SRF system operation limiting factors and its interlay with other systems such as cryogenic system and vacuum system etc. Exchange experiences in SRF linac performance optimization and up-time improvement. Identify opportunities in SRF system design advancement for high RAMI performance of next SRF linacs.

Topics

- Design gradient margins and preservation of initial installed gradients
- In situ processing techniques for cavity gradient and Q0 recovery
- Gradient maintenance methodology and techniques (spares or re-furbish)
- Low particulate cryomodule beamline interface installation
- Operational feedback for new cryomodule/cavity designs
- Maintaining vacuum integrity around high gradient CMs
- Beamline vacuum incident, impact, recovery and prevention
- Field emission turn on, prevention and recovery.
- Cool down/Warm up speed and durations.
- Vacuum seals

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TTC2020_CERN_LIPAc_r3

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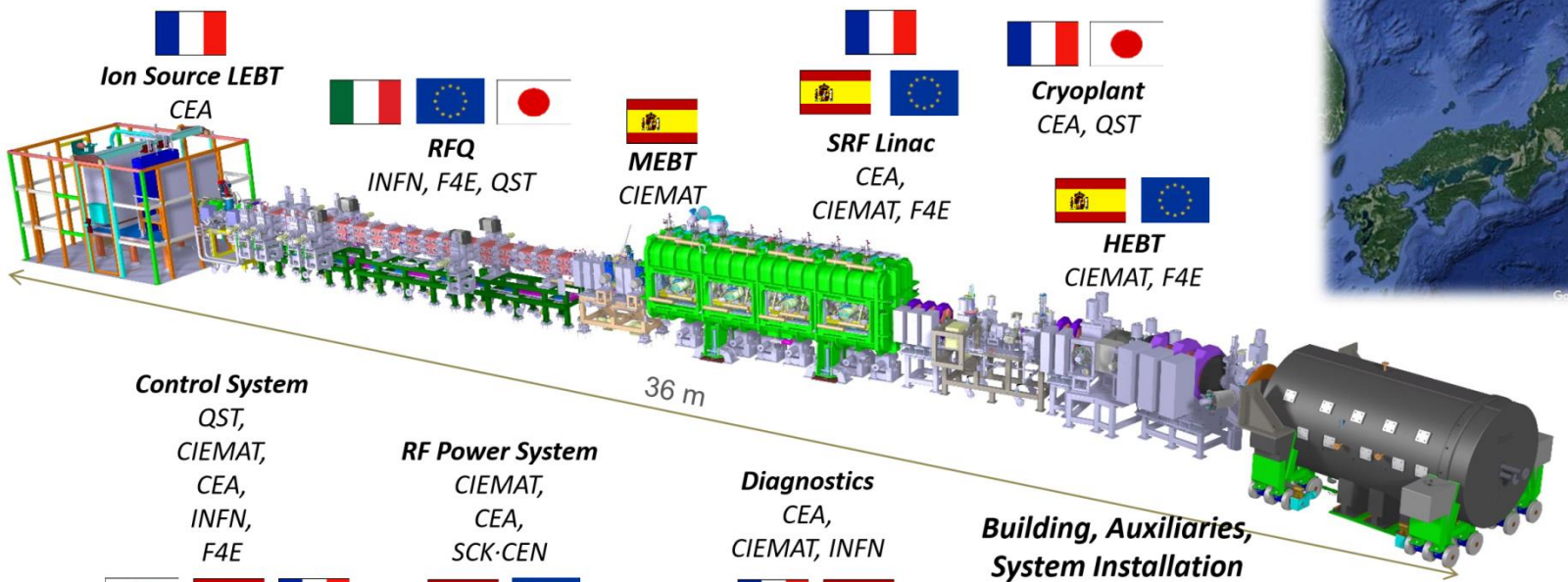
LIPAc Engineering Validation in Rokkasho

Japan-Europe scientific collaboration based on in-kind contribution under BA framework



Ion Source LEBT
CEA

RFQ
INFN, F4E, QST

MEBT
CIEMAT

SRF Linac
CEA, CIEMAT, F4E

Cryoplant
CEA, QST

HEBT
CIEMAT, F4E

Control System
QST, CIEMAT, CEA, INFN, F4E

RF Power System
CIEMAT, CEA, SCK·CEN

Diagnostics
CEA, CIEMAT, INFN

Building, Auxiliaries, System Installation
QST

BD
CIEMAT, F4E

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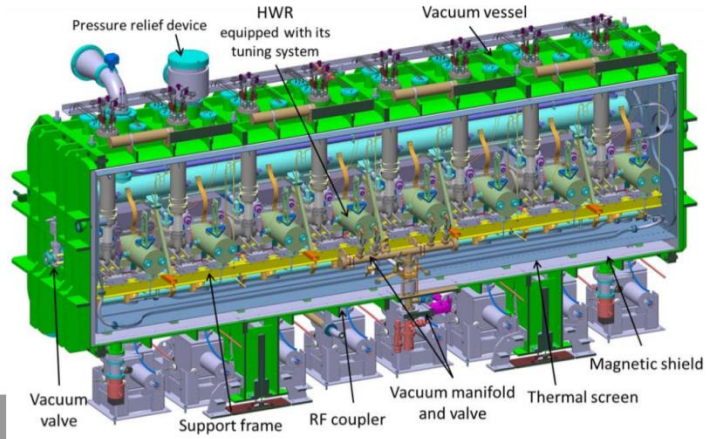
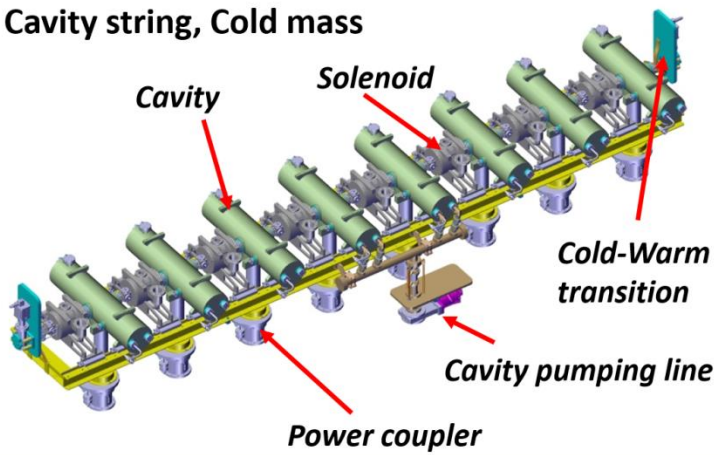
IFMIF LIPAc

LIPAc Cryomodule

FUSION FOR ENERGY QST



Cavity string, Cold mass



- Design under CEA/Saclay responsibility as well as procurement of the individuals components except the solenoid packages designed and procured by CIEMAT.
- Eight half-wave resonators
  - 175 MHz, β=0.094
  - $E_{acc\text{-}nom}$ = 4.5 MV/m, $Q_0 \geq 5 \times 10^8$
  - Operating temperature: 4.4 K
- Power Couplers
  - Designed to handle 200 kW CW
  - 70 kW CW maximum on LIPAc
- Eight superconducting solenoid packages
  - Two-nested solenoids to focus the beam (6T) with reduced fringe field (20 mT on cavity flange)
  - Two steerers for horizontal and vertical orbits
  - Beam position monitor (BPM)

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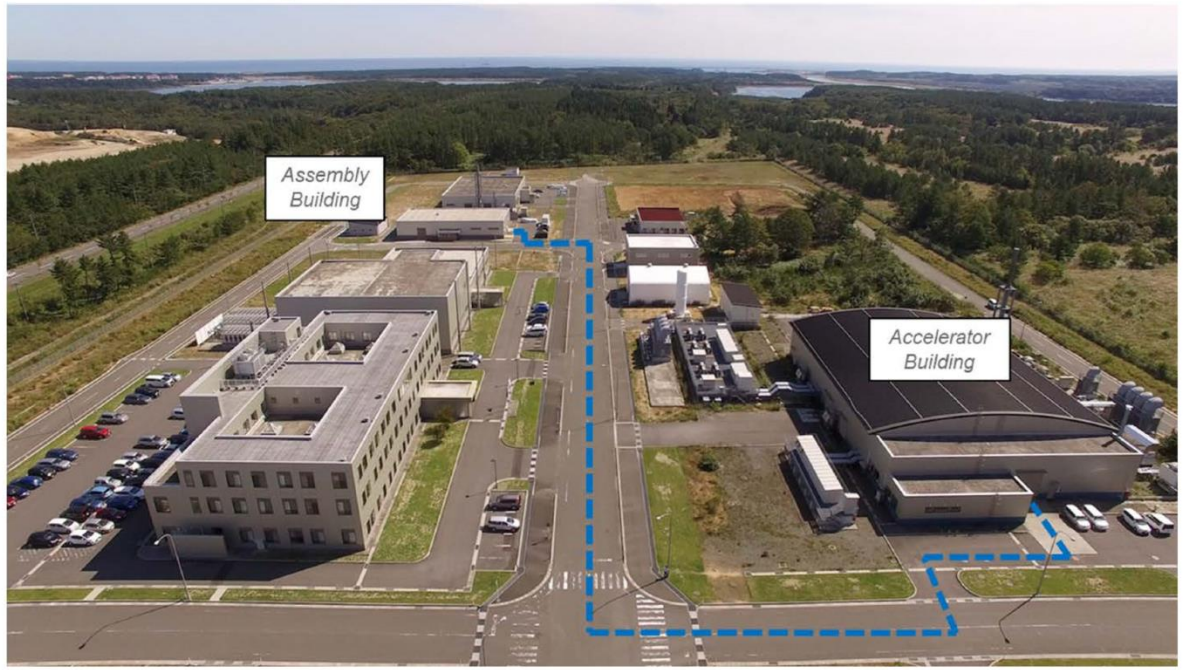
Cryomodule assembly in Rokkasho

- Manufacturing and qualification of the components in Europe, then shipped to Japan.
- All the cavity, RF power couplers and cryostat components were already delivered.
- Assembly of the cryomodule is performed under F4E's responsibility at Rokkasho Fusion Institute in a building close to the accelerator building.



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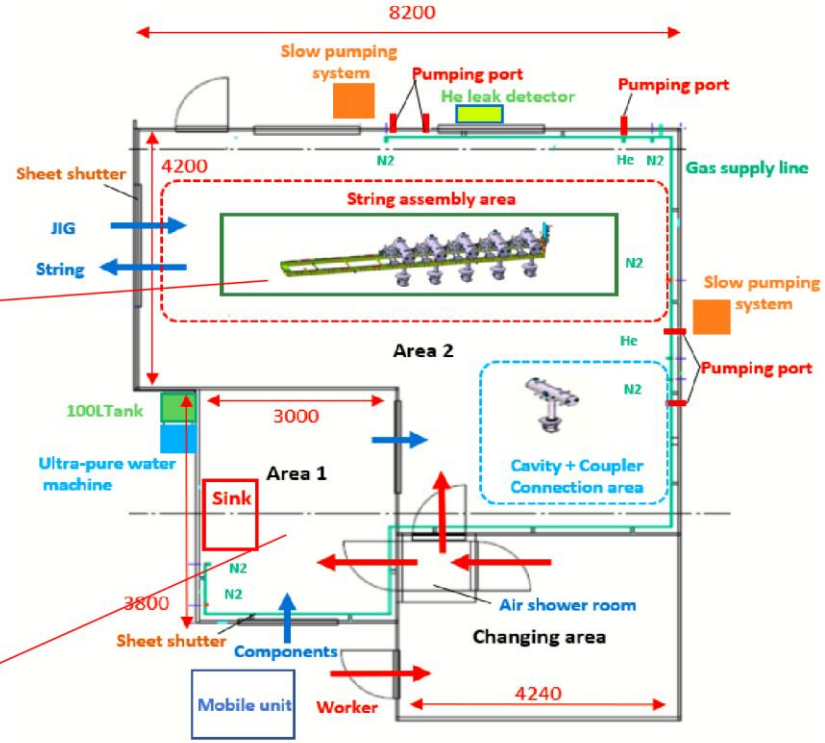
Clean room in Rokkasho

- ISO 14644-1 class 5 fully equipped clean room was was newly built in close coordination between QST and F4E, with the support of the CEA Experts.
- Slow pumping and particle monitor system was prepared in collaboration with KEK.



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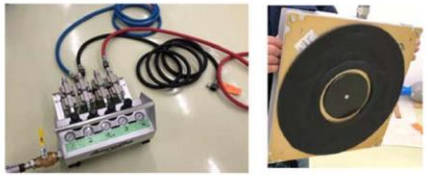
Cryomodule assembly

- All tooling for the clean room and the post clean room operations are on site.
- Vacuum vessel, thermal shield and phase separator are inside the assembly building, and ready for the cold mass assembly and its insertion in the cryostat.
- Connection of the cavity and the coupler started in March 2019, but now the work is suspended and waiting the solenoid delivery.



Air caster system

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30 years of TESLA / TTC Meetings

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- **we celebrate the gains in the community over the last 30 years**
- **we co-author a one page report for the CERN Courier with authors representing the three global regions**
- **We can use the two special seminar slots and a plenary talk as reflective talks from the past 30 years and invite appropriate speakers (former TTC Chairs)**

30 years of TESLA / TTC Meetings