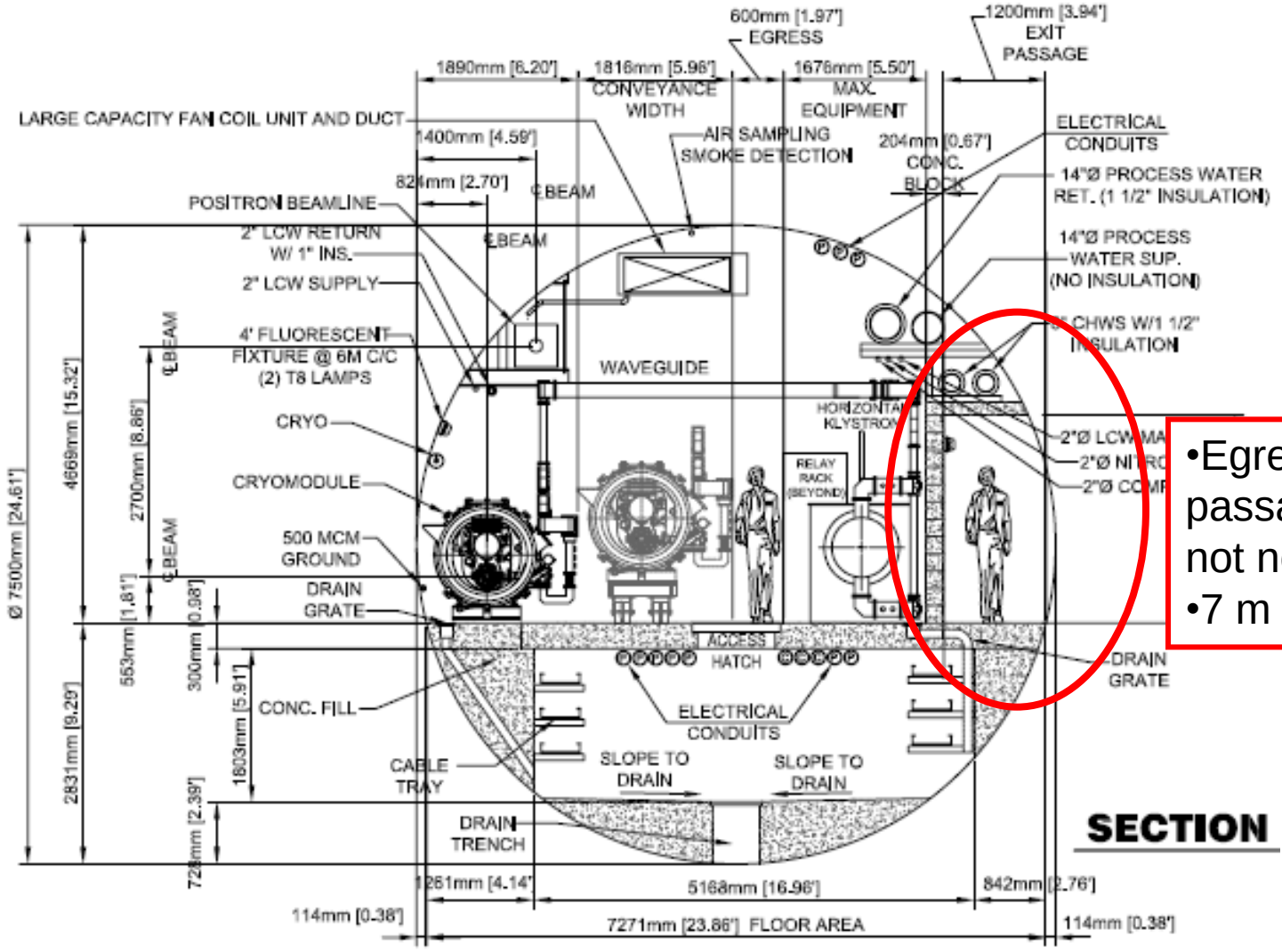
Recent Progress of DRFS

S. Fukuda/KEK

General Design and Overview of HLRF

- Since there are no HLRF weekly/monthly web-ex meeting, KCS and DRFS are independently progressed. KCS status will be presented by Chris Nantista and DRFS status will be presented by S. Fukuda.
- For single tunnel configuration of RDR, there are no serious progress. There are some comments comapring with DRFS case.

7.5 m Diameter Single Tunnel



- Egress passageway not needed;
- 7 m Ø ok

7.5 m Diameter Single Tunnel

RDR Case

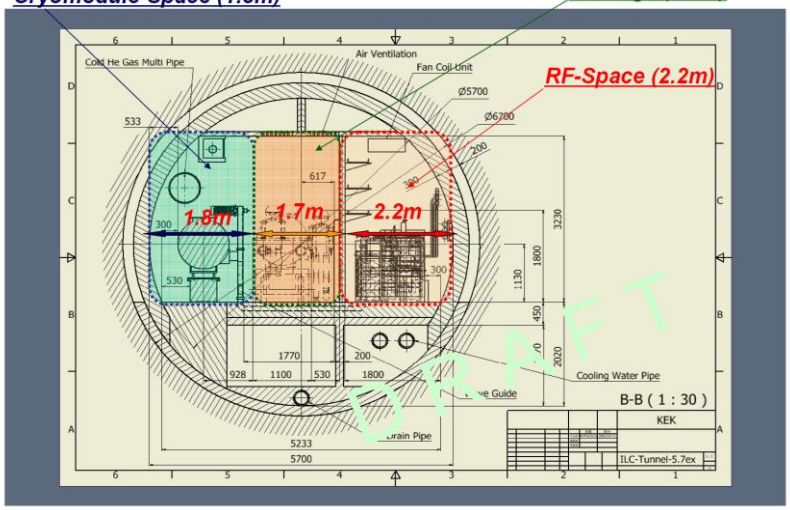
- **Single tunnel RDR case: tentative drawing of tunnel diameters are 7.5m (FNAL) and 6.5m (KEK). Elimination of egress passage way reduces the tunnel diameter to less than 7m (FNAL)**

- **Layout to be developed for RDR Single tunnel plan :**
  - Common layout should be included such as air ventilation and He evacuation
  - Same space for egress passage as other scheme such as DRFS
  - Same configuration of CFS with other scheme
- **Problems to be solved are almost the same as the DRFS case. :**
  - Radiation shield of the HLRF and LLRF components
  - Availability Evaluation especially for the MTBF of 10 MW MBK and Pulse modulator (or Marx Generator)
  - Maintenance Scenario
- **Who is responsible for design the RDR songle tunnel?**

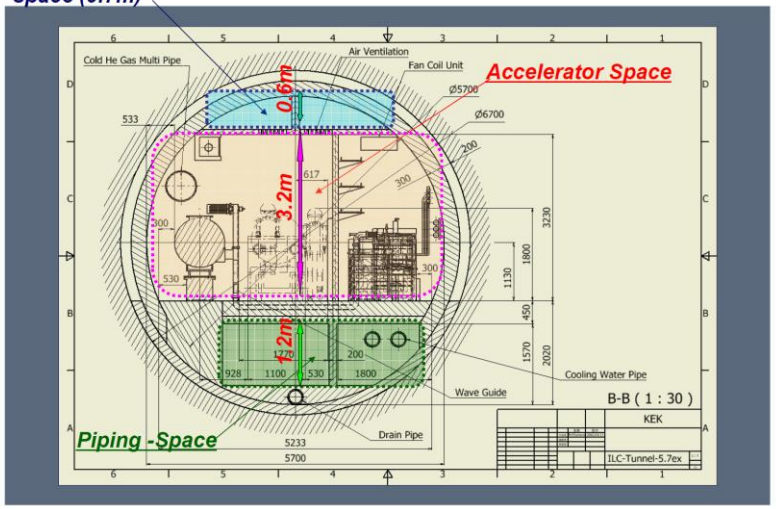
Resent DRFS Development

- **3D CAD data of DRFS Configuration are merged to the 3D CAD of CFS. More realistic layout including electricity plants, cooling system and cryogenics are started to discuss. Base line: 5.7m dia. Cryomodule on the floor.**
- **Zoning concept is introduced to develop more flexible configuration.**

Zoning Plan (in the Width Direction)

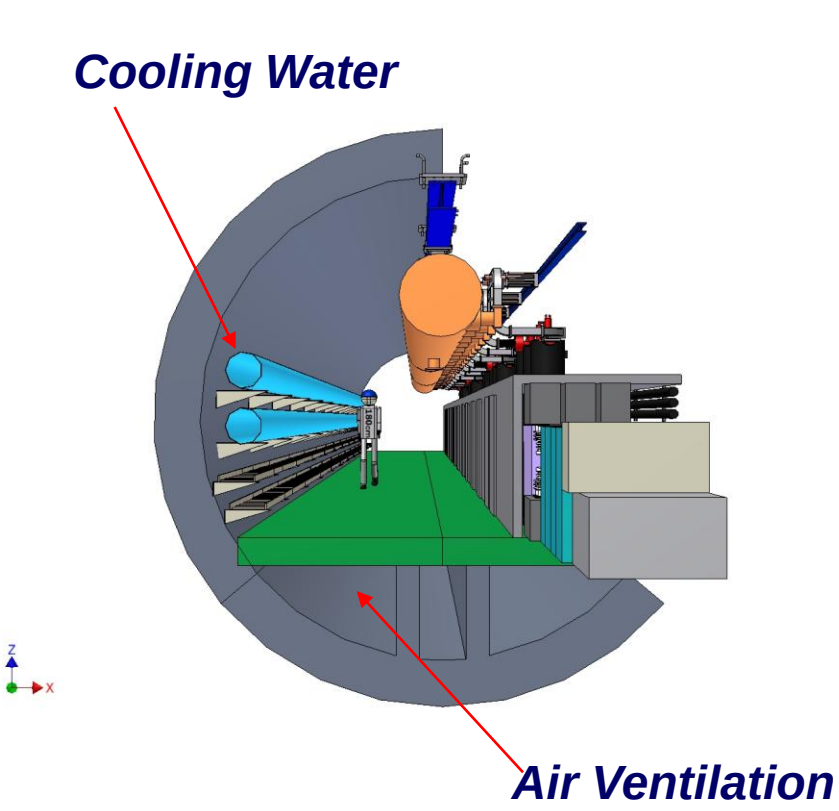


Zoning Plan (Height Direction)



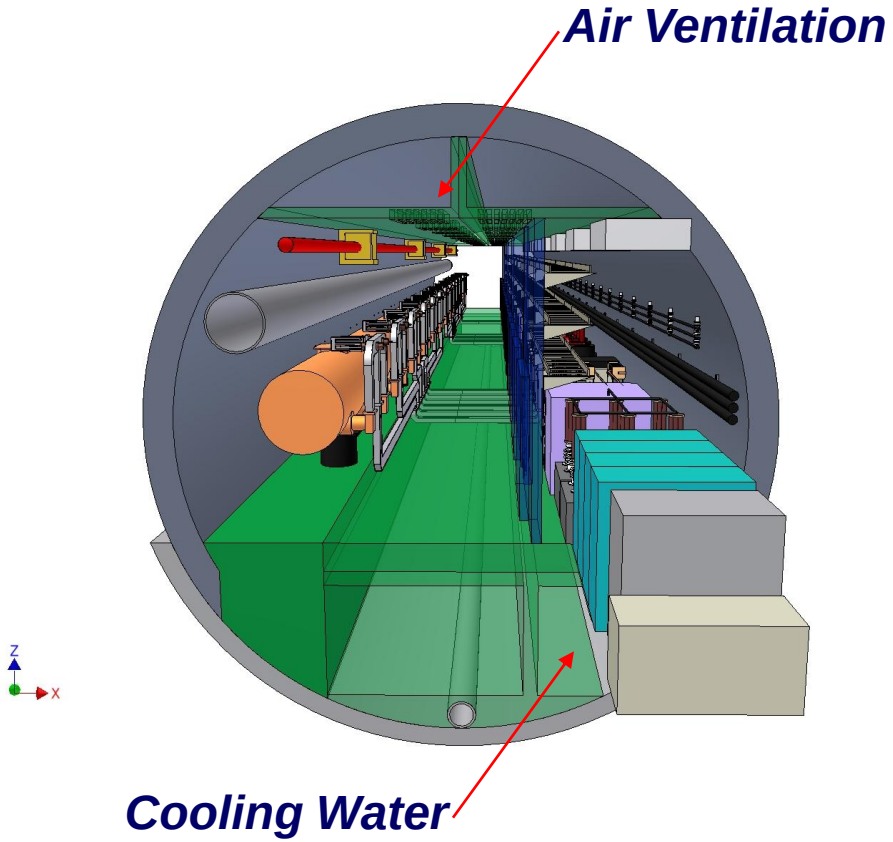
Typical DRFS Configurations

A Method of Cryomodule Hanging from a Ceiling



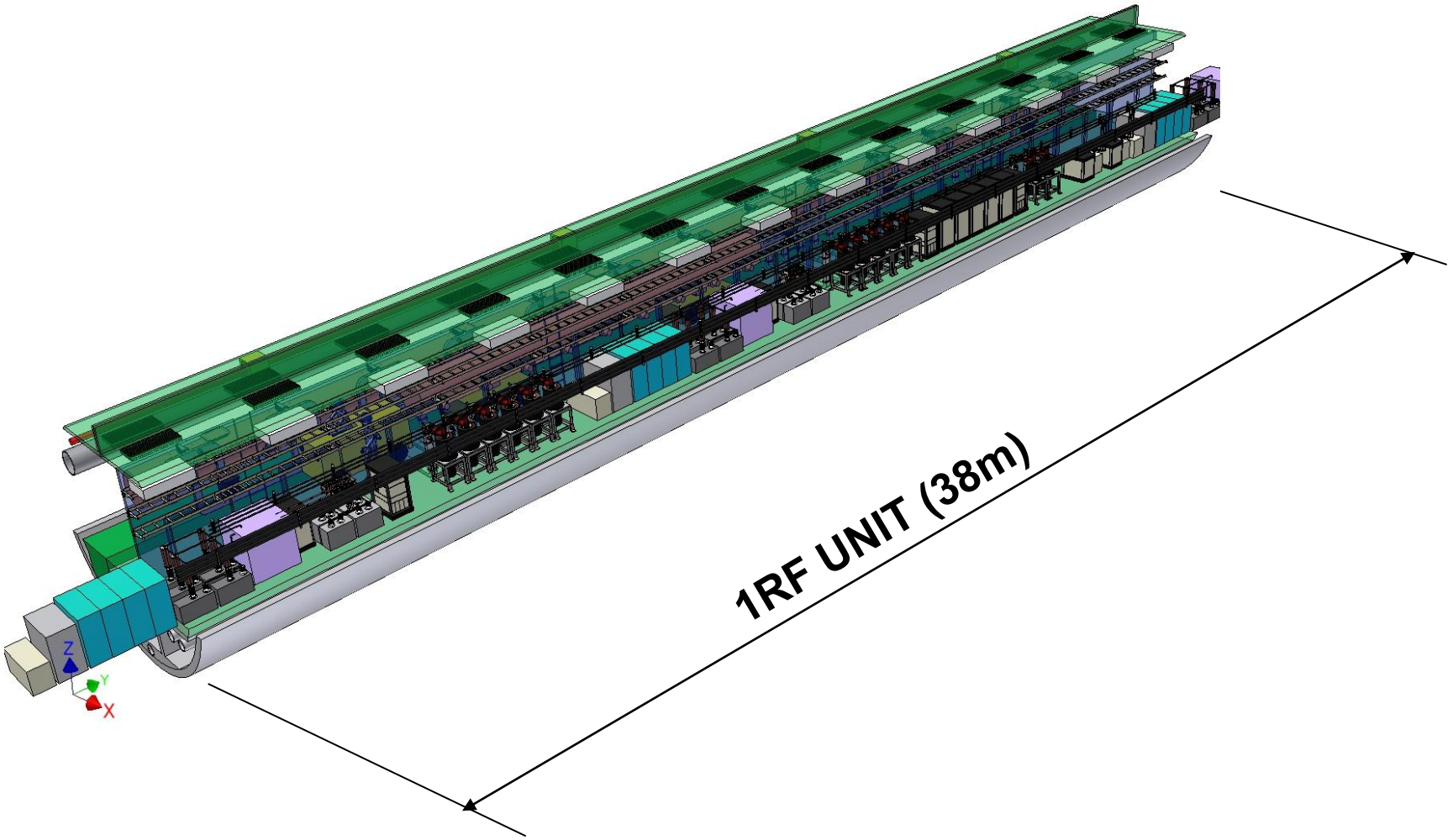
φ5.2m Section

A Method of Cryomodule Installing on Floor



φ5.7m Section

φ5.7m-Version Perspective



DRFS Layout

- **Layout consideration**
  - Radiation Shield is changed to be wall-like structure
  - Height limitation disappears and better space factor for the HLRF and LLRF components might be possible.
  - Floor height considering the drainage groove for cooling water
  - Maintenance space consideration for cryomodule and HLRL/LLRF components
  - Reconsideration of HLRF/LLRF components to make the maintenance space
  - Space for cable rack, space for cryogenic pipe
  - Better Configuration for power distribution system in the floor

DRFS R&D Current program

- 2 units DRFS for S1 global project(2010)
  - RF source of DRFS comprises of a prototype DC power supply, a modulating-anode (MA) modulator and 2 proto-type MA klystrons.
  - Power distribution system (PDS) employs the circulator-less system to show the feasibility of proposed DRFS PDS.
  - Power supply system has a simple crowbar circuit using a gap switch, available HV relays, but does not include the bouncer circuit.
  - LLRF feedback is also introduced to test the DRFS LLRF system.

- Prototype DRFS klystron outputting medium power of 750kW was designed and manufactured in 2009 and completed in 2010.

  Second tube is manufactured in 2010.

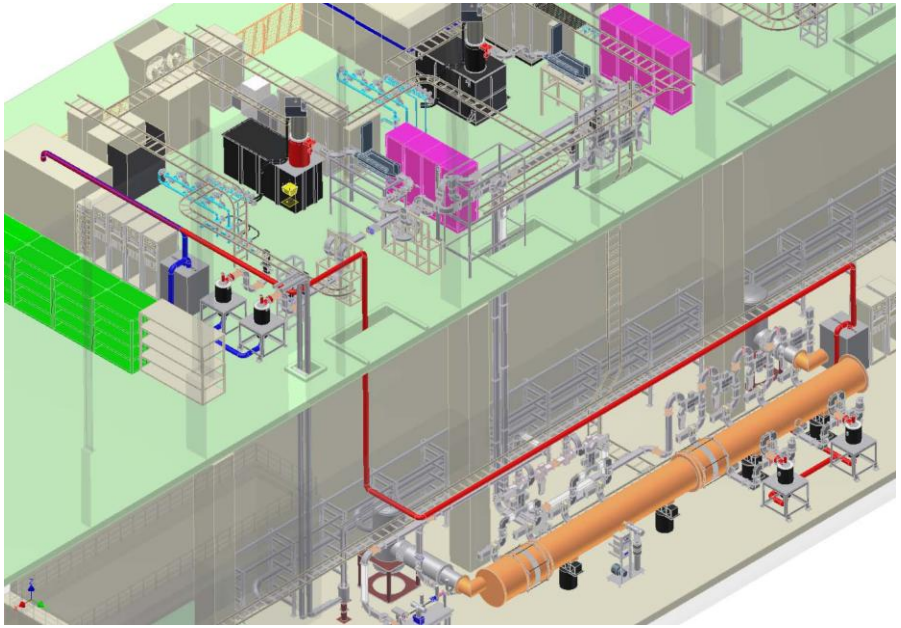
  Various evaluations will be performed after the S1-Global HLRF test.

- PDS performance using high isolation magic-tee without a circulator is investigated for 2-cavity system under the LLRF feedback.

  Crosstalk and diagnoses of cavity parameters at the pulsed tail are studied in S1-Global test.

DRFS R&D

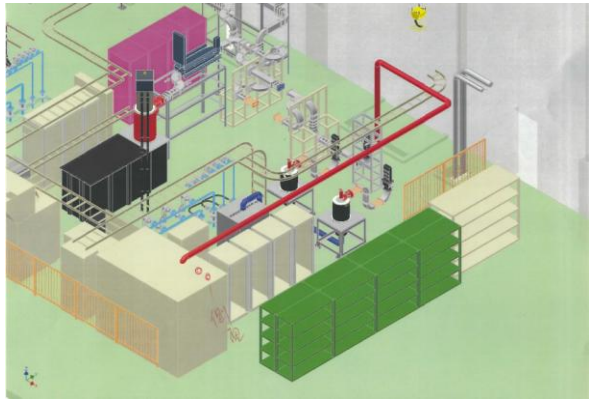
DRFS Demo in S1-Global



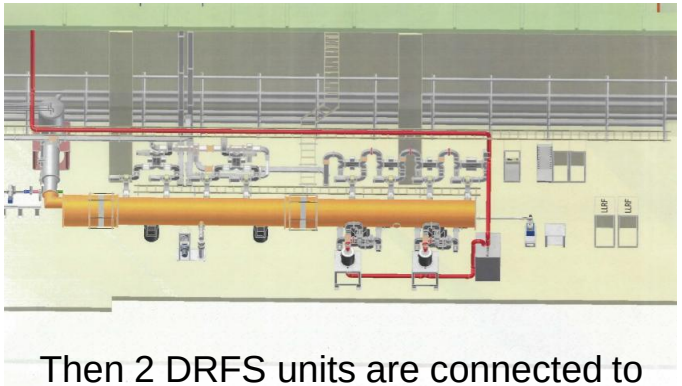
DRFS demonstration will be Prepared in the end of S1-global: December of 2010.

2 units DRFS

Birds eye view of STF site



First evaluation test is done in klystron gallery



Then 2 DRFS units are connected to the four cavities in the cryomodule.

DRFS R&D

- **S1-Global Demonstration**
- **Change of the DRFS Klystron Specification**
  - Output Power of DRFS
  - Should be changed from 750kW to 800kW Considering the Margin of the SC Cavity performance Distribution such as 31.5MV/m +-20%
    - Even for the case of pair of 38MV/m cavities, 10% overhead for LLRF requires about 800kW output from Klystron.
    - Further discussion is necessary from HLRF and LLRF
- **Klystron for 10 Hz Operation are newly proposed and we can expect almost the same efficiency in 10 Hz operation scheme.**
- **R&D for HV relay SW are proposed by US company and prototype will be expected to be tested in S1 global.**