Alternate Site and Tunnel Configuration Status Report KEK (1)

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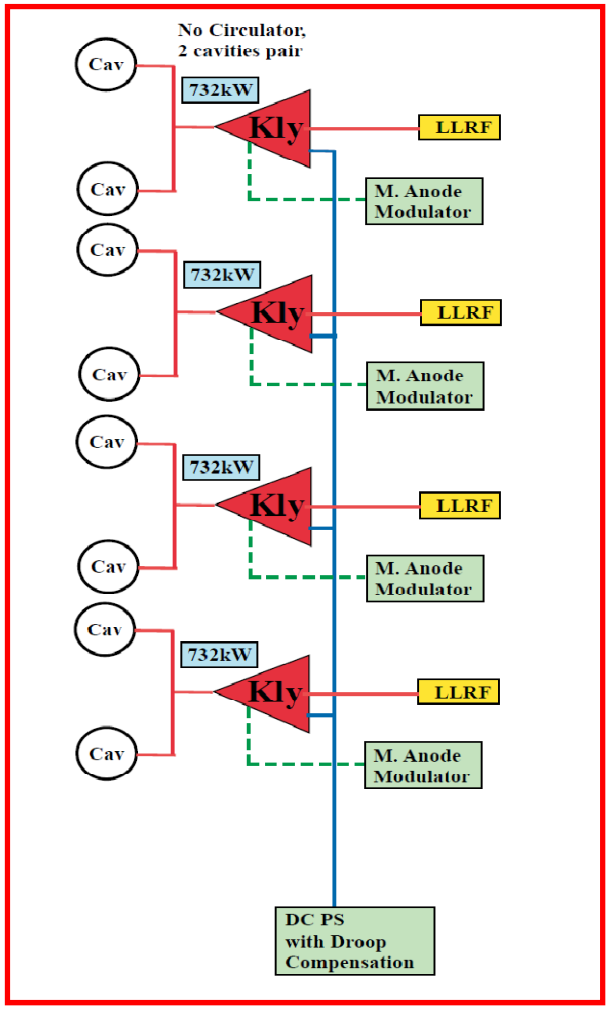
Aternate Site Study

Applicability of site / tunnel configuration

	Proposed Site ID	Tunnel depth	Tunnel configuration	Access to tunnel(s)	Access to klystron	Site Availability in Japan
1	RDR Americas & European sample site	Deep	Twin	Shaft	Anytime	Not available
2	RDR Asian sample site	Deep	Twin	Sloped tunnel	Anytime	Available
3	Dubna site	Shallow	Twin (shallow beam tunnel, near-surface service tunnel)	Shaft	Anytime	Not available
4	DESY Site	Shallow	Single	Shaft	No	Depend on tunnel depth
5	Americas Alternative (RF Cluster)	Deep	Single	Shaft	Anytime	Available
6	Asian Alternative (DRFS)	Deep	Single	Sloped tunnel	No	Available

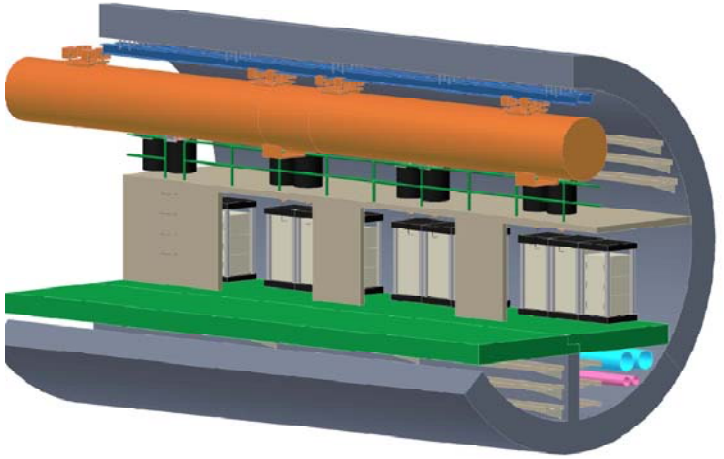
Cost(5):
Variation (II): Most cost effective method

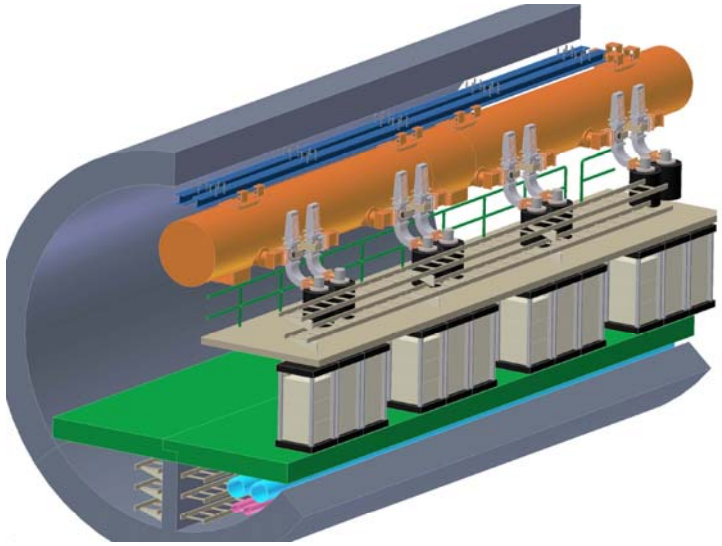
- Circulator elimination by power feeding to 2 cavities from one klystron. Output power is 732kW.
- Modulated Anode Klystron (MAK) is adopted.
- Anode modulation pulser does not need the high power and cost efficient pulser is manufactured.
- DC Power Supply is common for 26 cavities and voltage drop during the pulse is compensated with appropriate circuits at the level that LLRF can feed back.
  - It is easy to suppress the collector power dissipation without rf in MAK by adjusting the modulated anode voltage.
  - Are Disconnection SWs necessary?

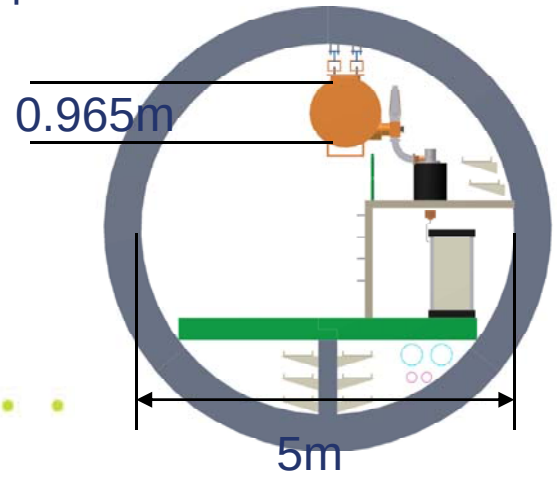


Rough Sketch for DRFS

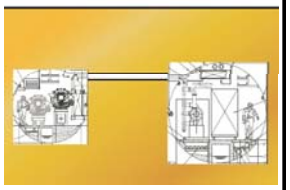
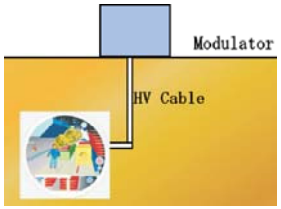
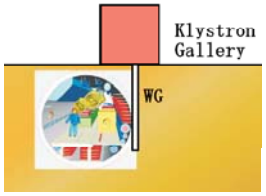
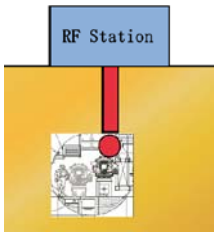
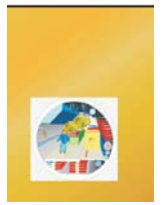
- Single tunnel layout. 5m diameter (like DESY)
- Cryomodule is hanged down from the top of the tunnel.
- RF sources are connected thru circulator, but plan without circulator is possible and discussed.
- In this drawing, a modulator applies the voltage to two RF source. Working space are considered as shown in the drawing.
- Modulators, LLRF units and other electrical devices are installed in the shielding tunnel.
- There is a choice that the DC power supplies or chargers are concentrated for 4 or 8 units or more.
- Layout of using a modulated anode klystron is possible.







Alternative scheme proposed

	BCD	DESY	DUBNA	RF Cluster	DRFS
Scheme					
Deep/Shallow					
Civil Cost					
Cooling Cost					
Heat source					
Site Dependence					
LLRF handling	○	○	○	△	◎
Vector Sum	26 cav. Vector Sum	26 cav. Vector Sum	26 cav. Vector Sum	780 cav. Vector Sum	1 to 1
Redundancy	○	○	○	△	◎
Kly Failure Impact	26 Cavity Stop	26 Cavity Stop	26 Cavity Stop Easy Klystron Replace	Easy Klystron Replace	Scattered failure section
Other Issues		Long HV Cable		Long Vacuum WG System	Very Simple Configuration
R&D Cost	○	○	○	△	◎
Test Facility	3 Cryomodule/26 Cavity= 1 RF unit	3 Cryomodule/26 Cavity= 1 RF unit	3 Cryomodule/26 Cavity= 1 RF unit	Difficult to evaluate one minimum unit	Very small system
Total Cost					

Summary

(1) An alternate site/tunnel configuration which has a single tunnel configuration and suitable for the Asian sample site has been studied.

(2) The basic feature is compact size of RF source units directly attached with a couple of cavities, of which scheme enables lower high voltages, lower powers. This seems a scheme easier to treat (transport, install, …) and operate (power feed, water-cool, control, …), then is more reliable and safe in operation.

(3) Cost impacts will be studied hereafter.