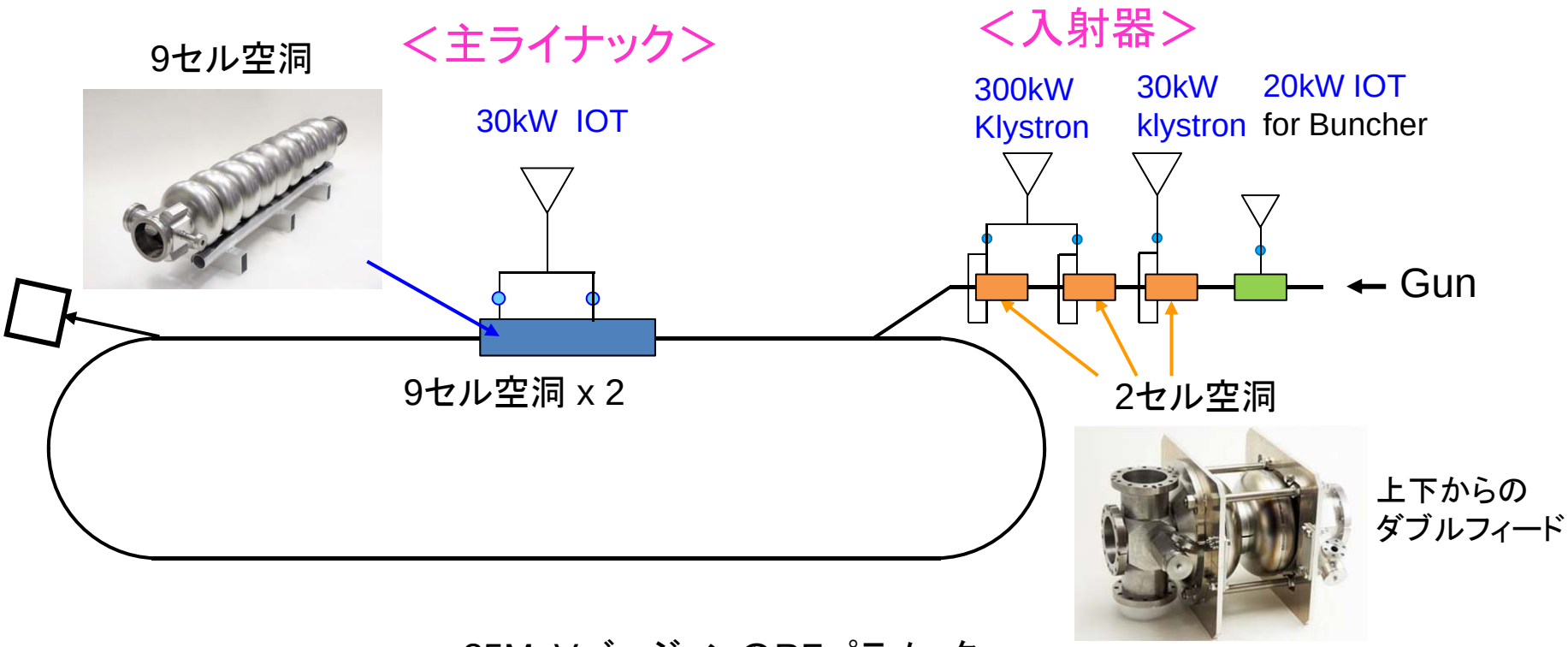
RF源の準備状況

KEK 三浦

高周波源の構成（35MeV,10mAバージョン）



35MeVバージョンのRFパラメータ

Item	Unit	Buncher	Inj-1	Inj-2	Inj-3	ML-1	ML-2
Structure		NC	SC	SC	SC	SC	SC
Gradient	MV	0.14	1	2	2	15	15
Q_L			5×10^5	2×10^5	2×10^5	2×10^7	2×10^7
Beam Phase	degree	–90	–15 to –30	–10	–10	0	0
Power Required	kW	4.5	10	37	37	11	11
Power Output	kW	6.2	17	122		30	
RF Source		IOT	Klystron	Klystron		IOT	
Power Available	kW	20	30	300		30	

30kW CW Klystron

300kW CW Klystron

30kW CW IOT

20kW CW IOT

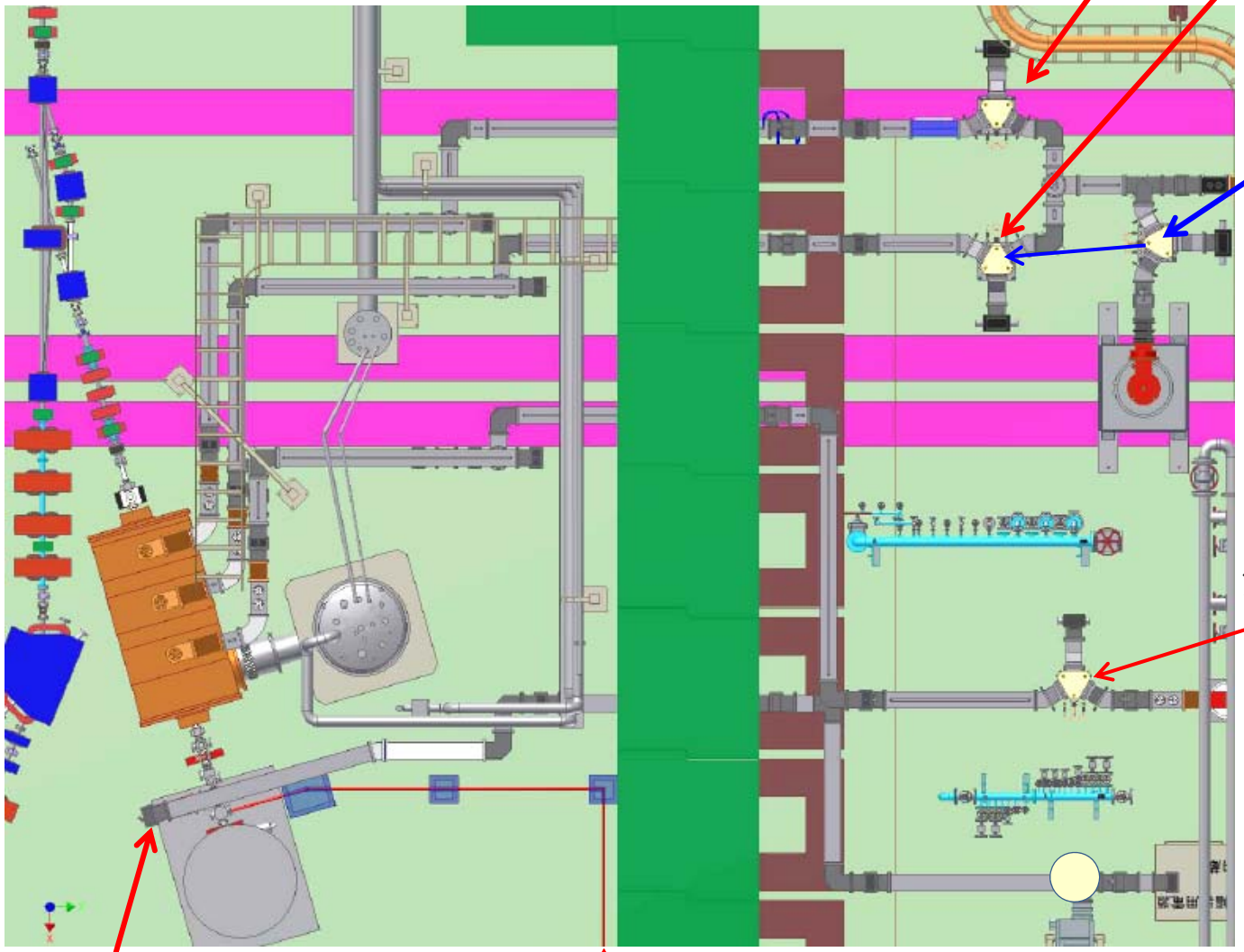
年度末に納品予定

20 kW CW 1.3 GHz IOT Amplifier

IOT Amplifier L-4445

Ratings	Symbol	Min.	Max.
Heater Voltage	V	5	7
Heater Current (Operating)	A	20	30
Heater Current (Surge)	A	---	60
Heater Warm-up Time	Seconds	300	---
Beam Voltage	kV	28	36
Beam Current	A	---	2.0
Idle Current	A	0.0	0.5
Body Current	mA	---	60
Solenoid Current	A	20	30
Collector Dissipation	kW	---	55
Load VSWR	---	---	1.5:1
Bias Voltage (with respect to cathode)	V	-50	-150
Grid Current	mA	---	±150
Ion Pump Current (Beam On)	µA	---	20
Ion Pump to Cathode Voltage	kV	3	4
Bandwidth (-1 dB)	MHz	3.0	---
Bandwidth (-3 dB)	MHz	5.0	---
Gain with 150 mA of idle current	dB	20.0	---
Output Power	kW	---	25
Beam Efficiency @ 20 kW	%	43	--

入射器側導波管敷設案



第3空洞用150kWサーキュレータ

第2空洞用150kWサーキュレータ

カップラーテストスタンド用
(運転時は第2空洞用)

300kWクライストロン
(東芝)

第1空洞用30kW Cir.

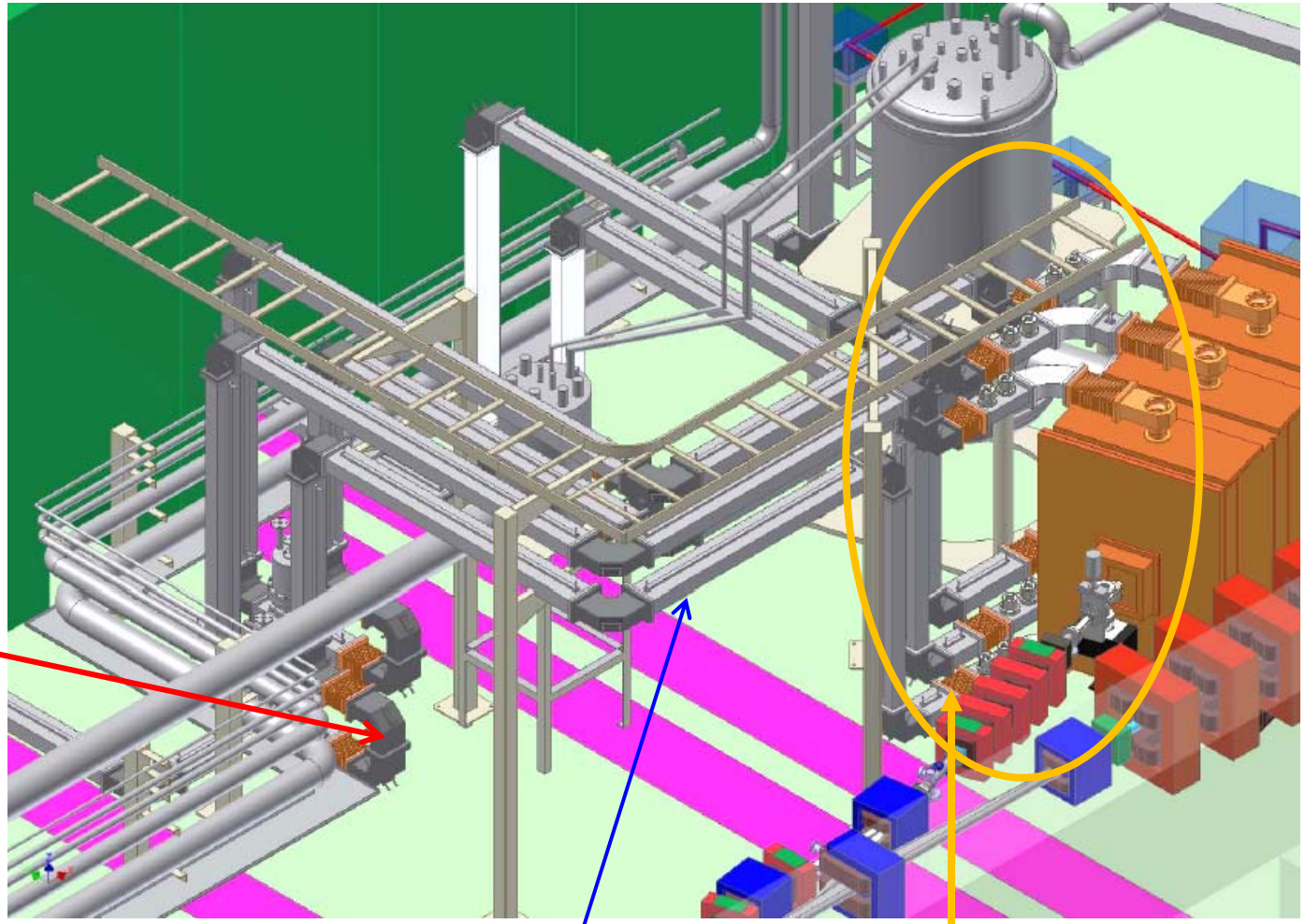
25kWクライストロン
(東芝)

バンチャー用
20kW IOT
(L3:今年度内納品予定)

レーザーの経路

バンチャー空洞用の導波管は、レーザーと経路の干渉を避けるため、内側に回り込む。

遮蔽体内側

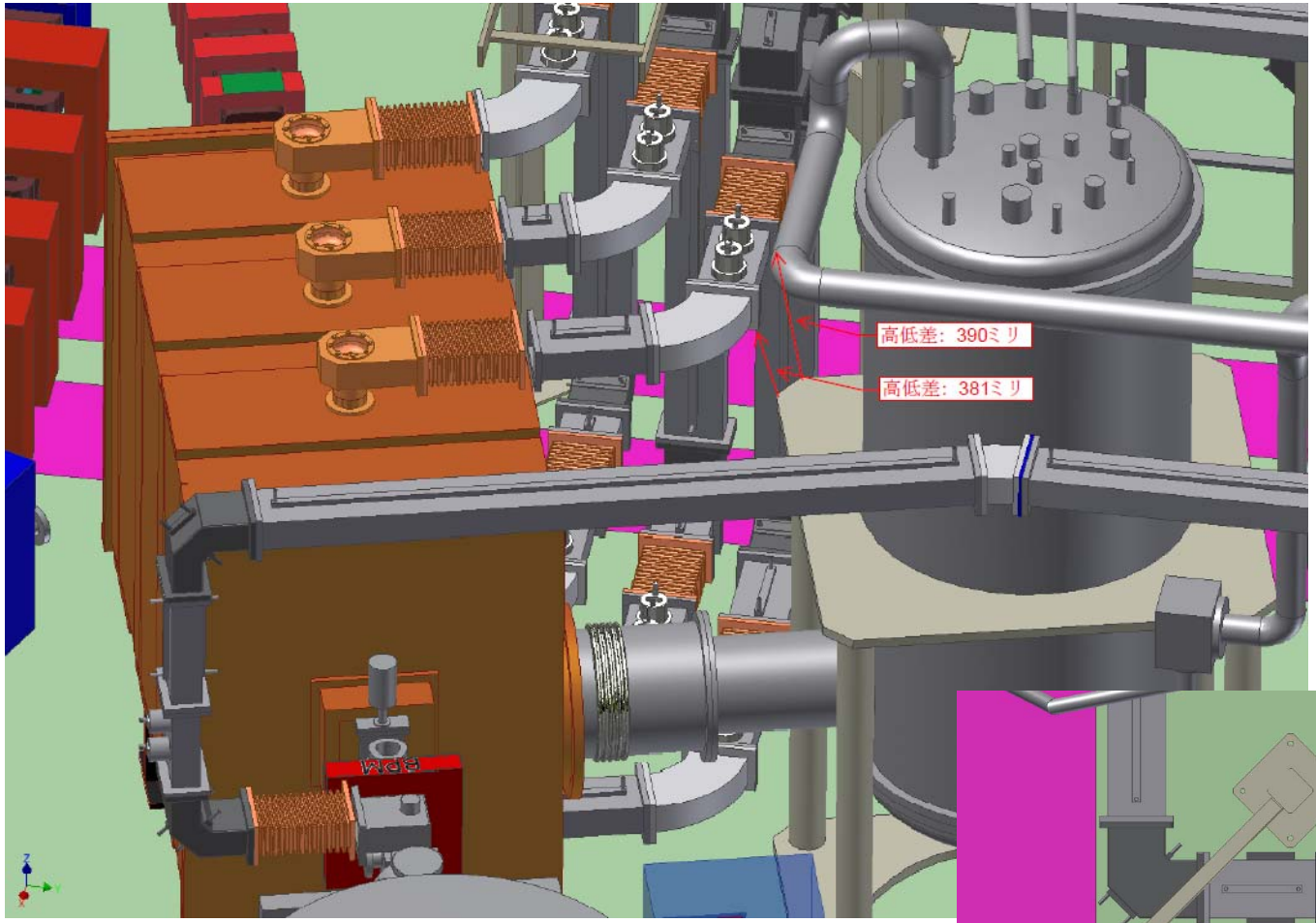


位相微調整用
Uリンク(3箇所)

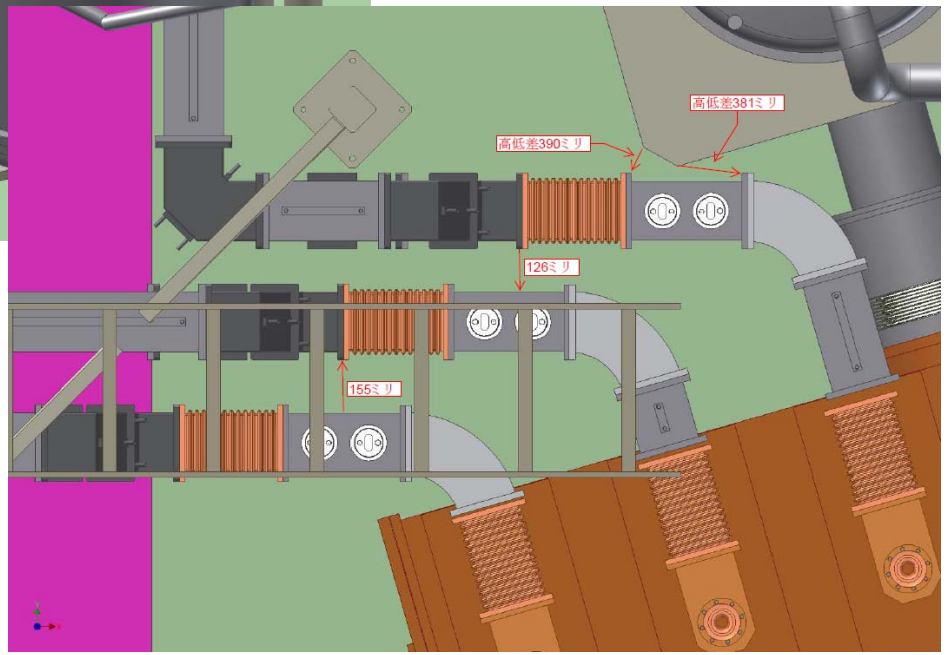
通路を確保するために下側のカップラーに
接続する導波管も一度上に上げる。

空洞近くは非常に込み合う

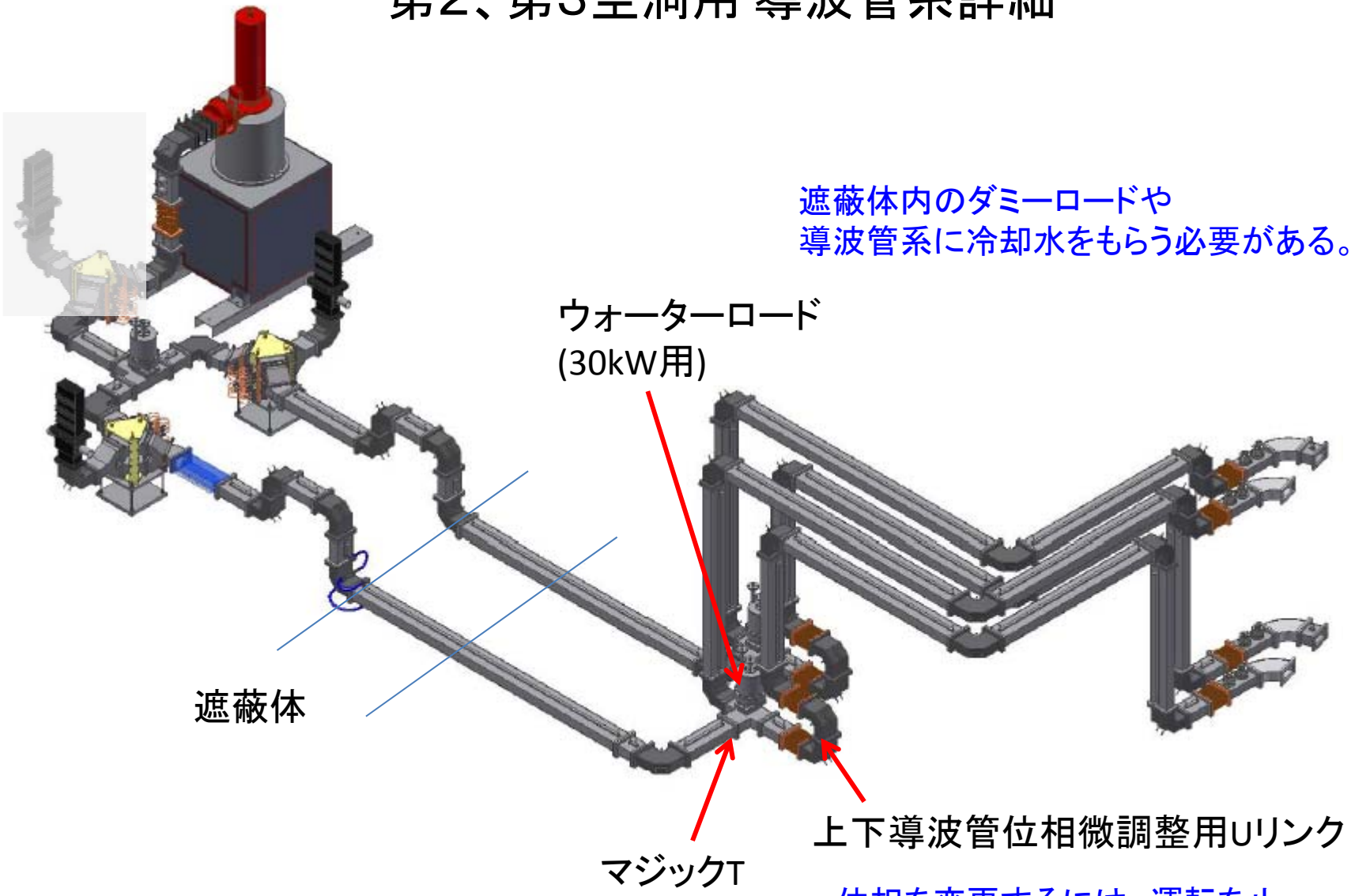
入射Linac付近



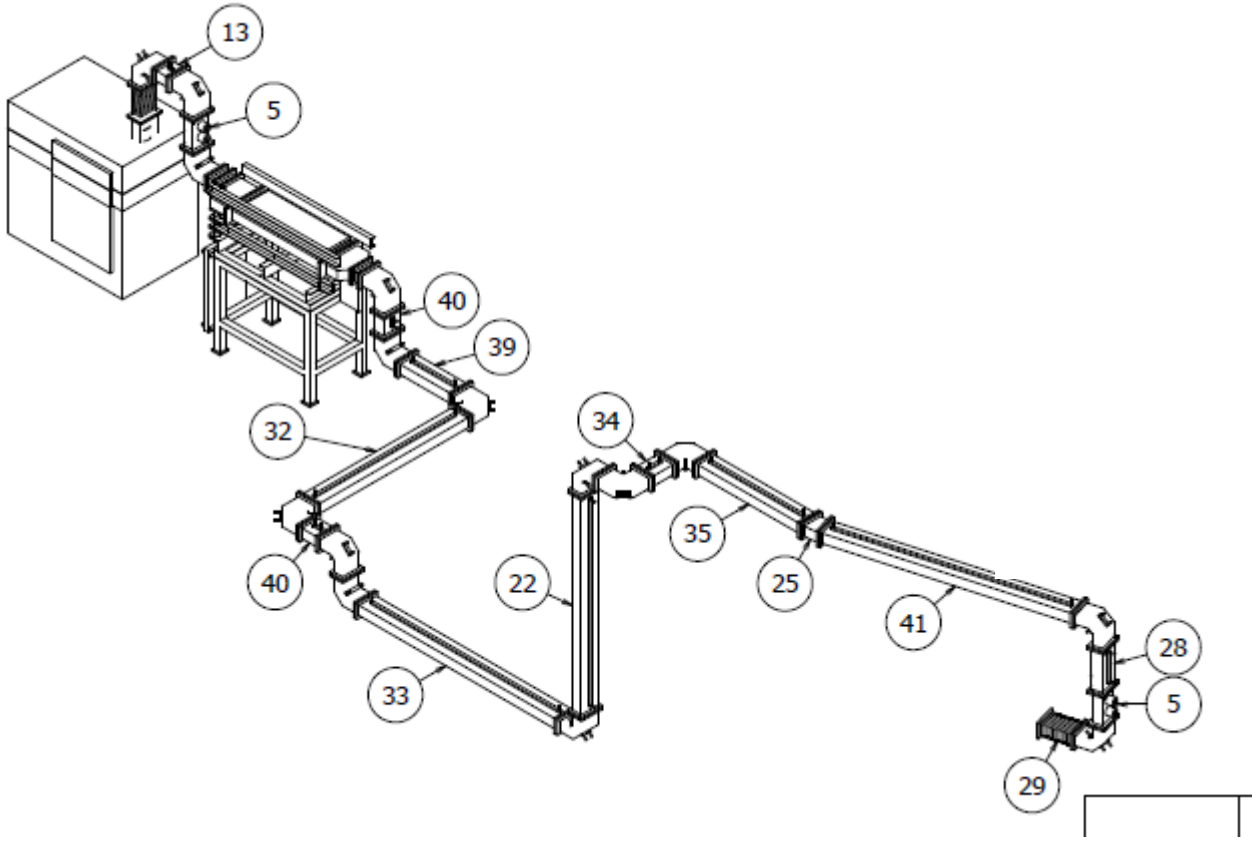
上から見た図



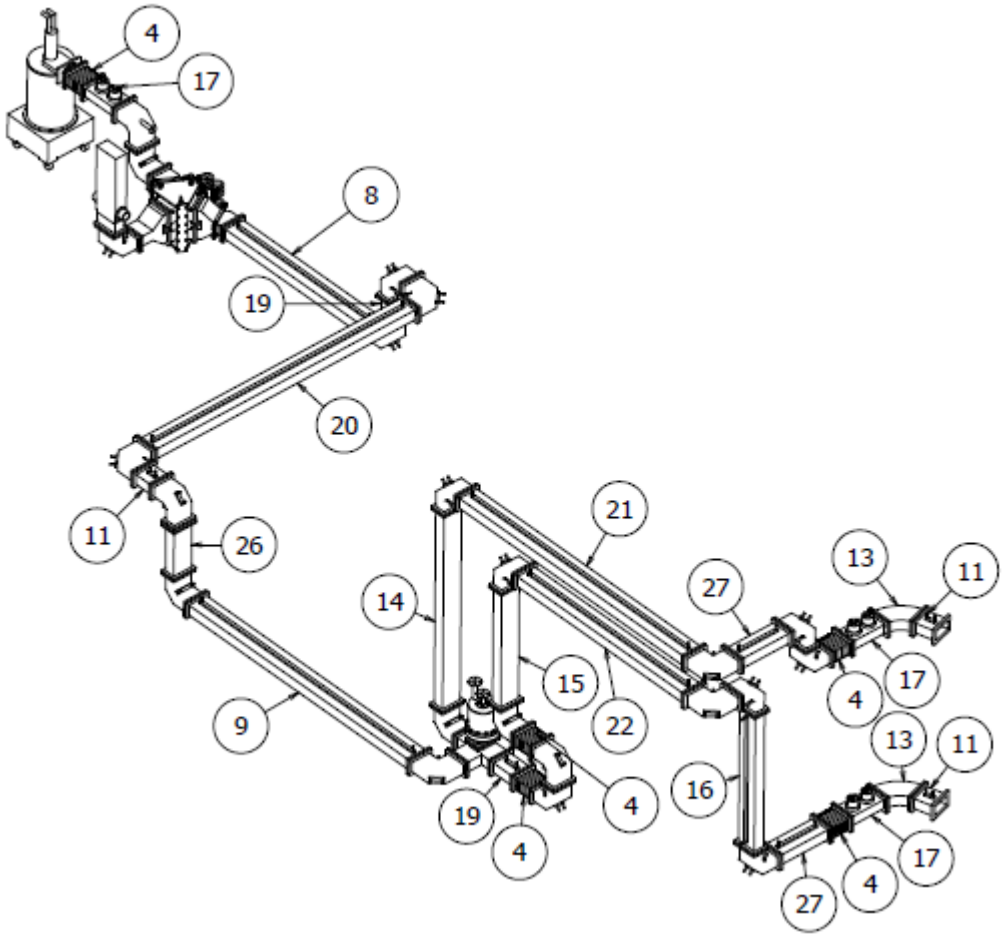
第2、第3空洞用 導波管系詳細



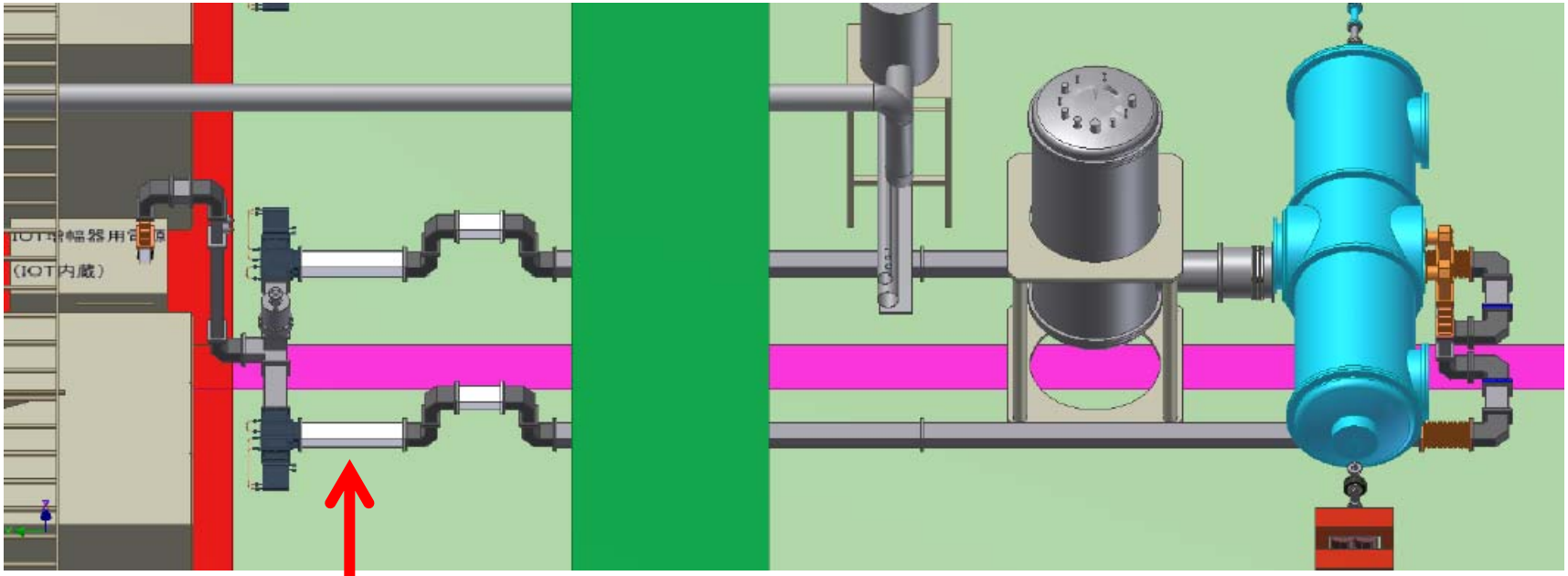
バンチャー部



第1空洞用

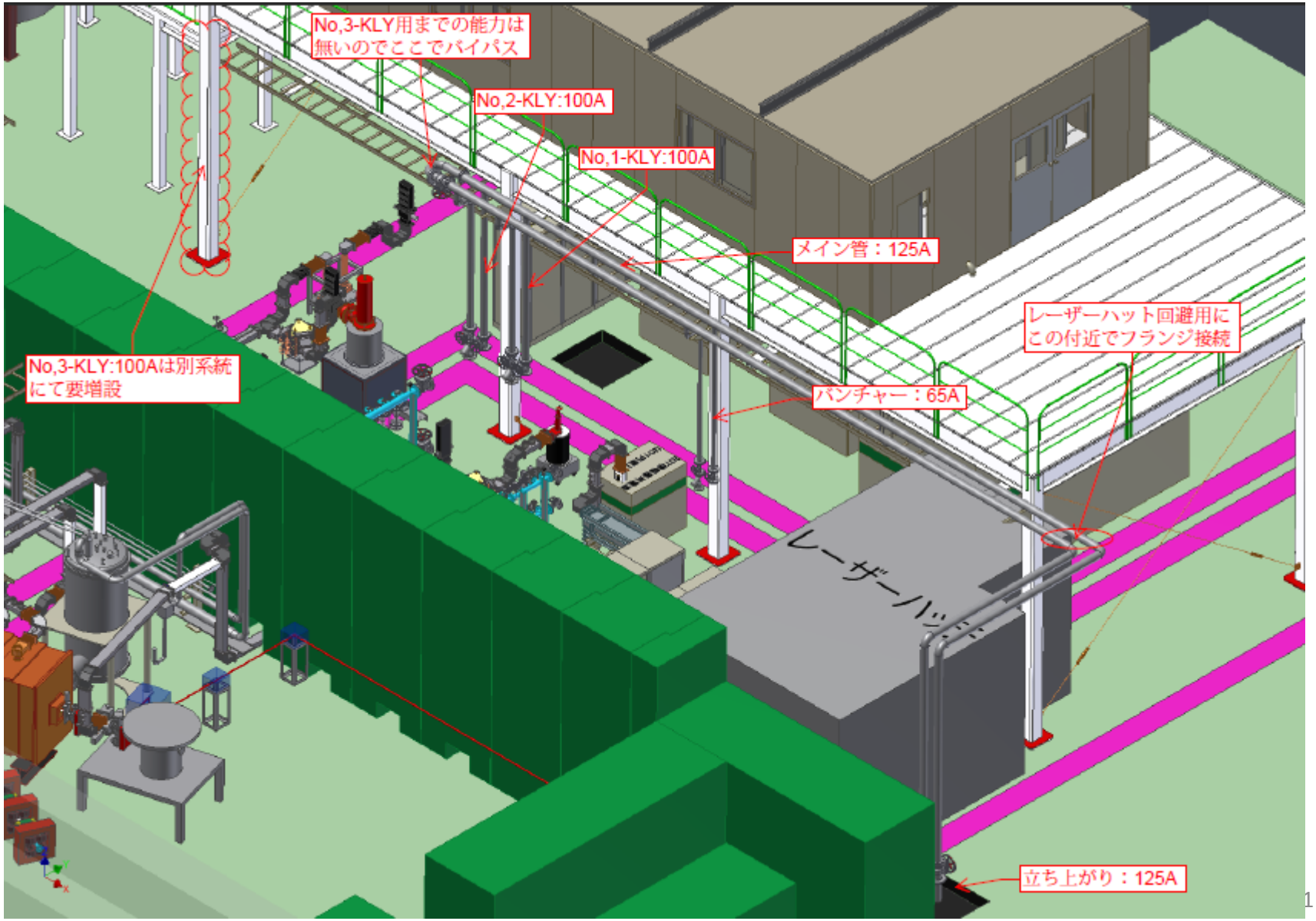


Main Linac 1st and 2nd Cavity

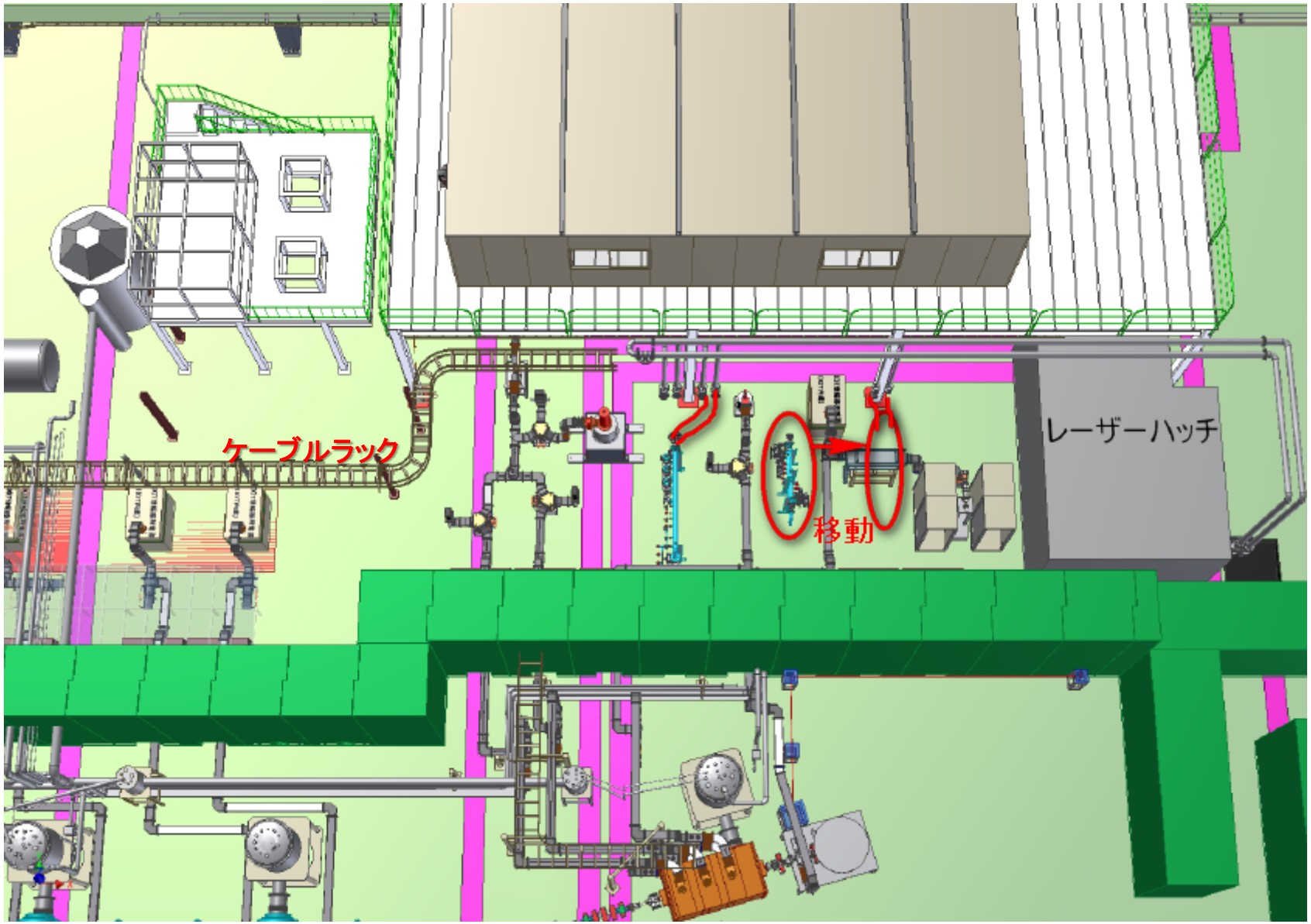


通路

C系統枝管付冷却水配管の新設

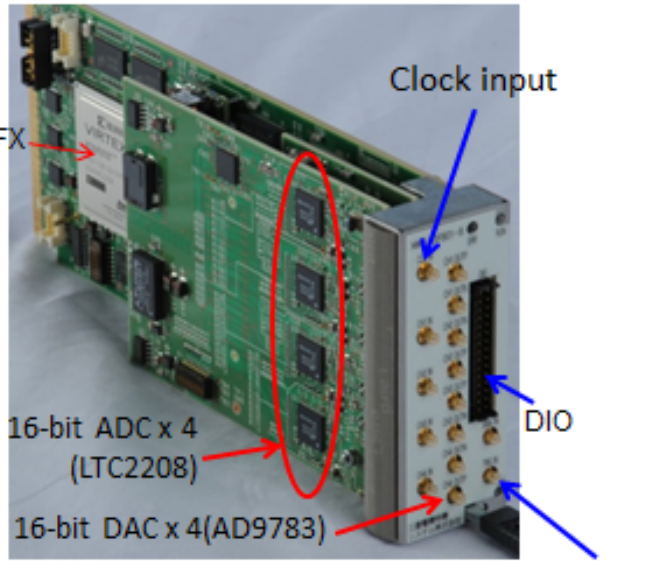


C系統枝管付冷却水配管の新設

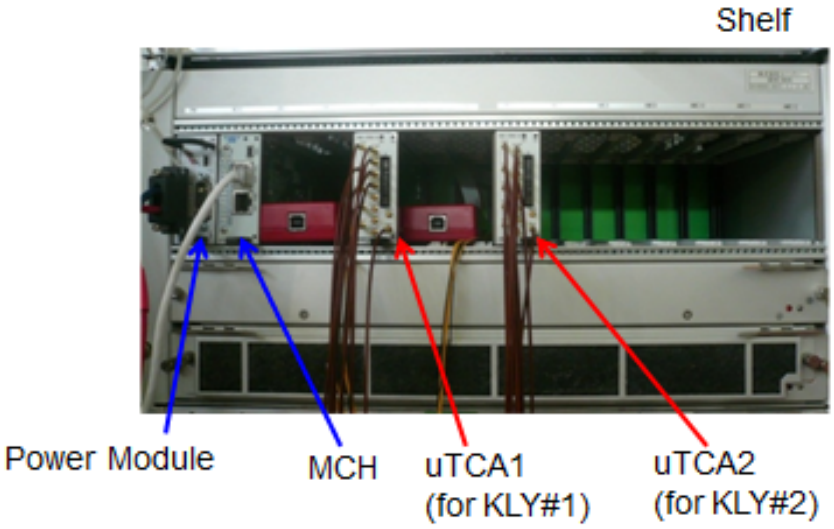


LLRFデジタルフィードバックボードの進捗状況
(STFのDRFSのStudyで実際にフィードバックを行った)

Micro-TCA digital feedback board



AMC(Advanced Mezzanine Card)



Data communication is performed through Gb Ethernet bus at the backplane.

The board has been developed for cERL-project (CW operation) at KEK.

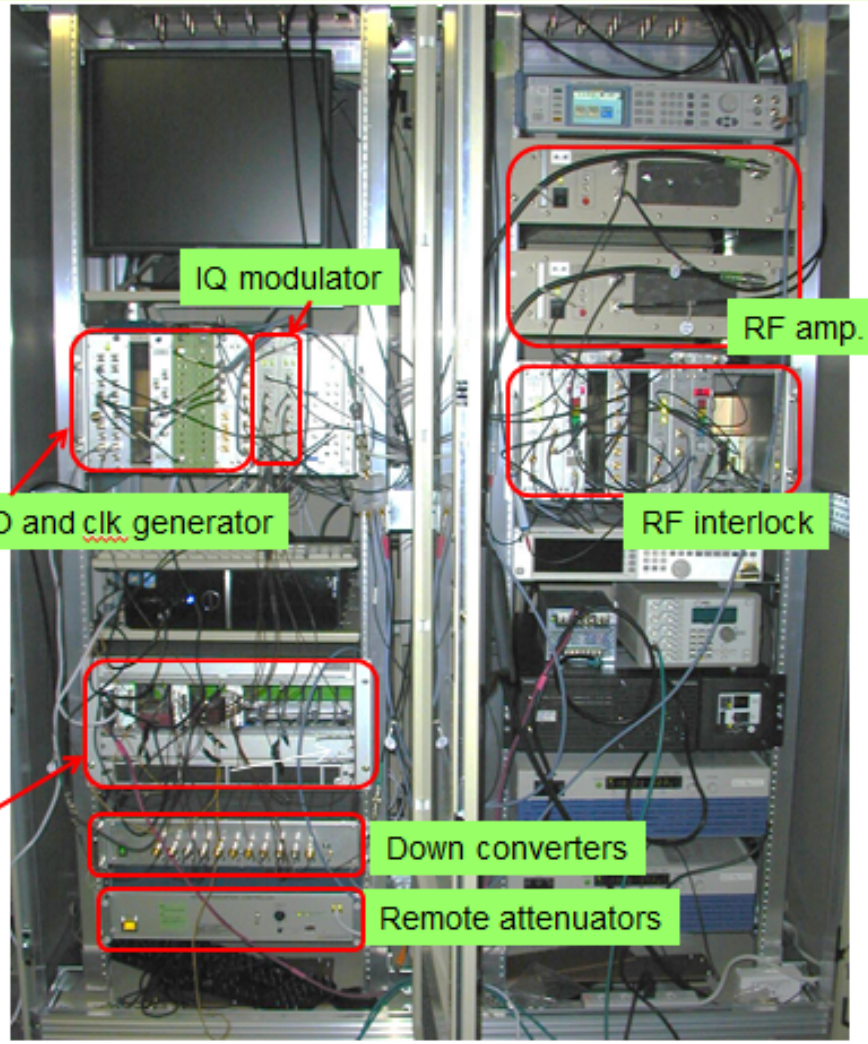
For DRFS, the logic was changed for pulse operation.

EPICS was installed in the digital board for communication control.

EPICS: Experimental Physics and Industrial Control System

LLRF rack layout in the tunnel

- LLRF rack is located near the cryomodule.
- μTCA digital feedback system are used for DRFS.



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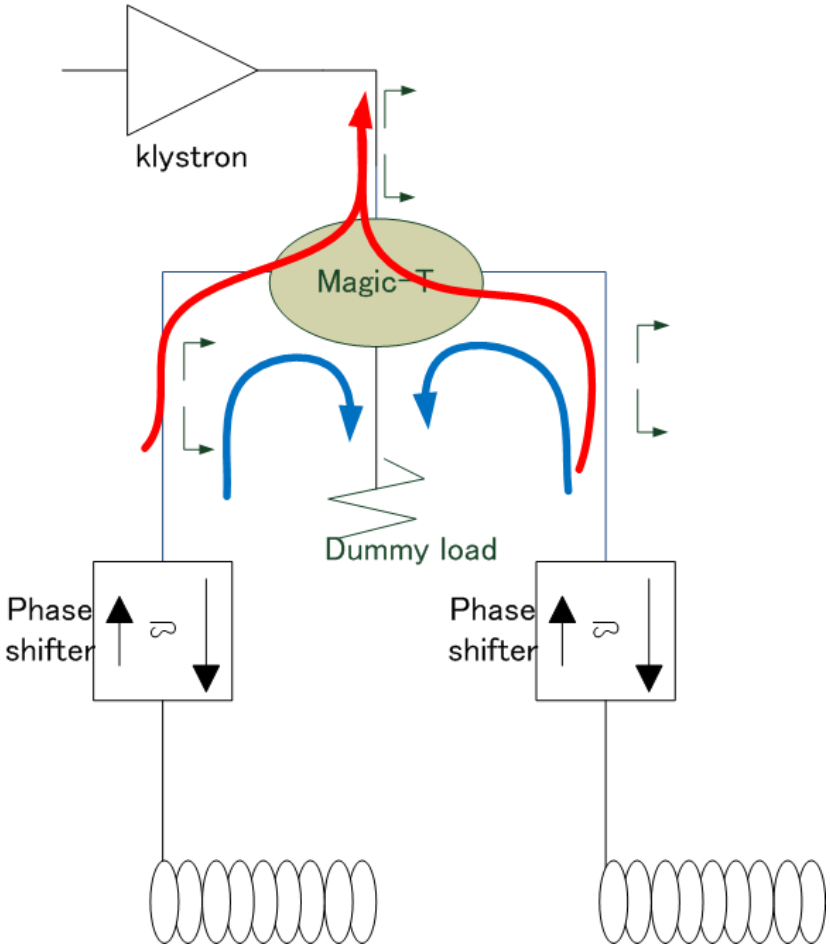
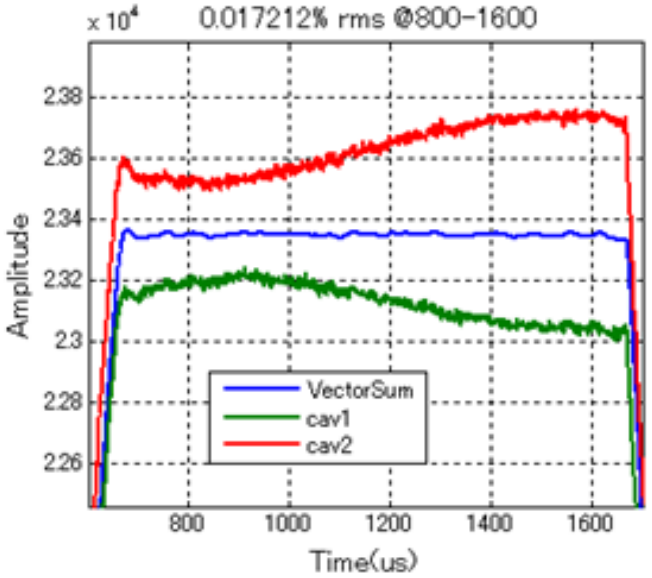
DRFSの試験時の導波管系(PDS)

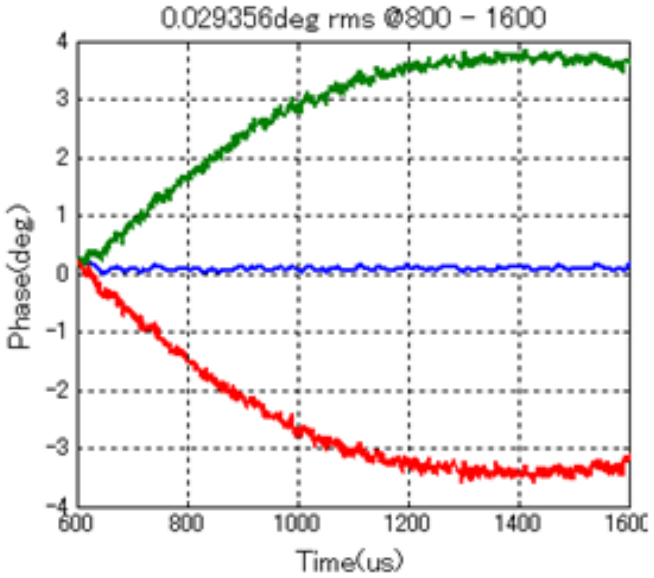


2空洞に対するベクターサム運転

Feedback Performance in DRFS

μTCA2: HV=67kV, IIR=35kHz , Vector-sum Operation for Cav1,cav2
FB + FF Operation





Stability : 0.017% rms in Amplitude

0.03 deg. rms in Phase

These results satisfy the requirement of ILC, 0.07% and 0.24°.

まとめ

20kW IOTが今年度納品

導波管系の敷設案に基づき、導波管系を購入開始

C系統冷却配管の新設予定(入札中)

開発中のデジタルフィードバックボードをSTFで試験 （ビーム無）
パルス運転で、パルス内安定度は0.017% rms, 0.03deg. rms.