

DELIVERY RECORD

Client: Japan Atomic Energy Agency (JAEA)
High Energy Accelerator Research Organization (KEK)
Facility: J-PARC (Japan Proton Accelerator Research Complex)
Location: Ibaraki, Japan

1 October 2018

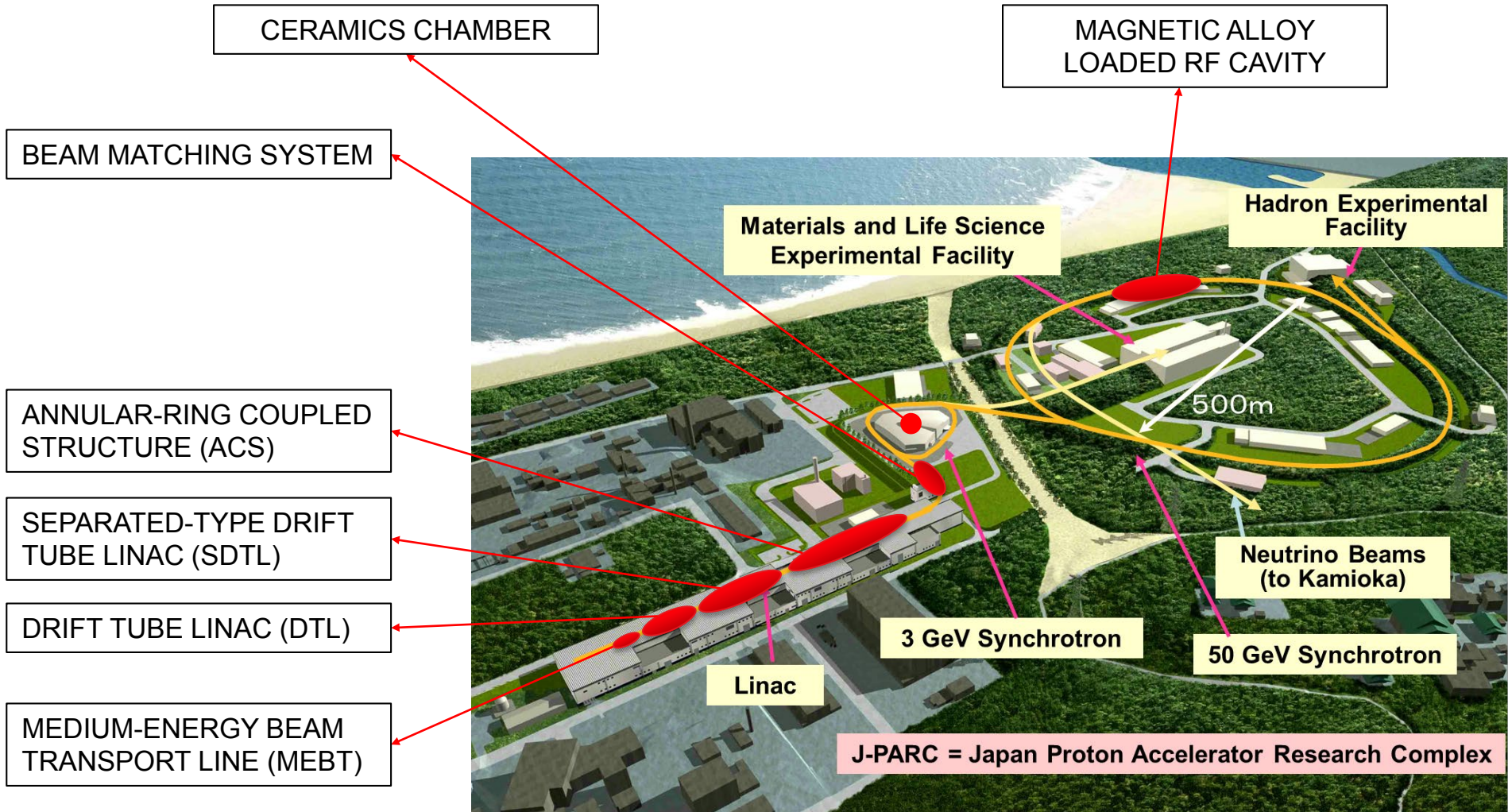
 **MITSUBISHI HEAVY INDUSTRIES MECHATRONICS SYSTEMS, LTD.**

Machinery Systems Sales Department

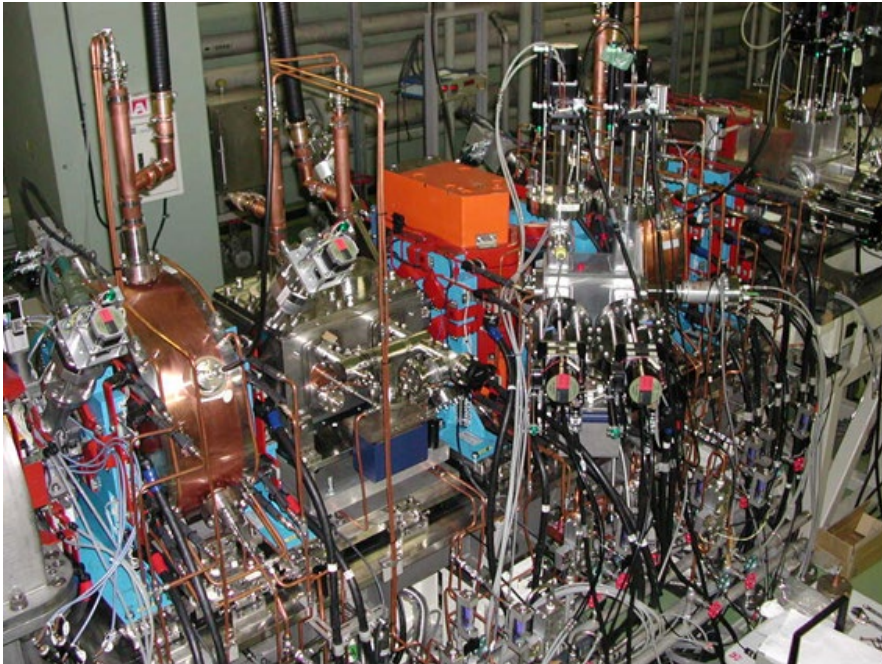
MHIMS0115009

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1. OVERVIEW



2. MEDIUM-ENERGY BEAM TRANSPORT LINE (MEBT)

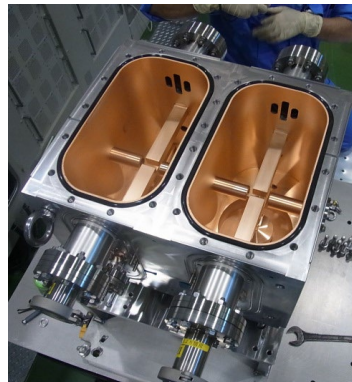


Main Parameters

Beam	H ⁻
Beam Energy	3MeV
RF Frequency	324MHz
Length	2.8m
Structures	Buncher: 2 RF Chopper: 1 Beam Scraper: 1 Quadrupole Magnet: 7 Bending Magnet: 1



New RF
Chopper



3. DRIFT TUBE LINAC (DTL)

Main Parameters

Frequency	324 MHz
Structure	Drift Tube Linac (DTL)
Accelerating Type	Standing Wave (TM010) 0 mode
Accelerating Field	2.5 ~ 2.9 MV/m (design value)
Input Power	~ 1.2 MW, 600 μsec, 50 Hz
Q-value	48000 ~ 52000
Total Length	27.1 m
Tank Length	9.9, 9.4, 7.3 m
Delivery Number	3 Tanks

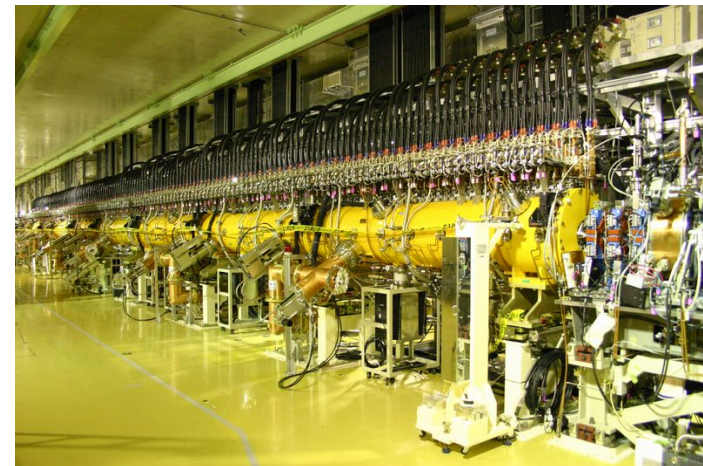
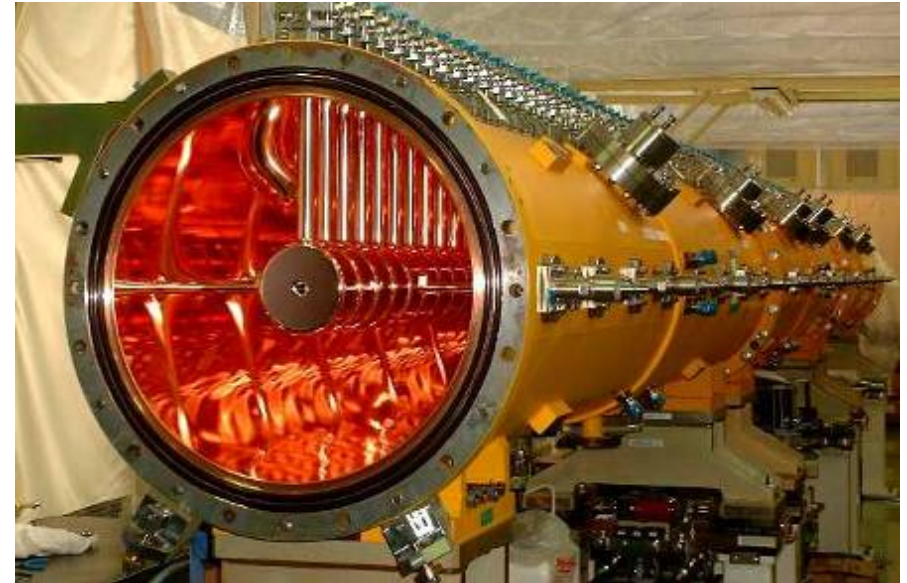


Photo courtesy of JAEA/KEK/J-PARC

4. SEPARATED-TYPE DRIFT TUBE LINAC (SDTL)



Photo courtesy of JAEA/KEK/J-PARC

Main Parameters

Frequency	324 MHz
Structure	Separated-Type Drift Tube Linac (SDTL)
Accelerating Type	Standing Wave (TM010) 0 mode
Accelerating Field	2.5 ~ 3.7 MV/m (Design Value)
Input Power	~ 1.0 MW, 600 μsec, 50 Hz
Q-value	40000 ~ 42000
Total Length	91.2 m
Tank Length	1.5 ~ 2.6 m
Delivery Number	32 Tanks

5. ANNULAR-RING COUPLED STRUCTURE (ACS)

Main Parameters

Frequency	972 MHz
Structure	Annular-Ring Coupled Structure
Accelerating Type	Standing Wave (TM010) $\pi/2$ mode
Accelerating Field	4.1 ~ 4.5 MV/m
Input Power	2.7 MW, 600 μ sec, 50 Hz
Q-value	18000 ~ 20000
Total Length	108.3 m
Module Length	3.9 ~ 5.0 m
Delivery Number	21 Modules

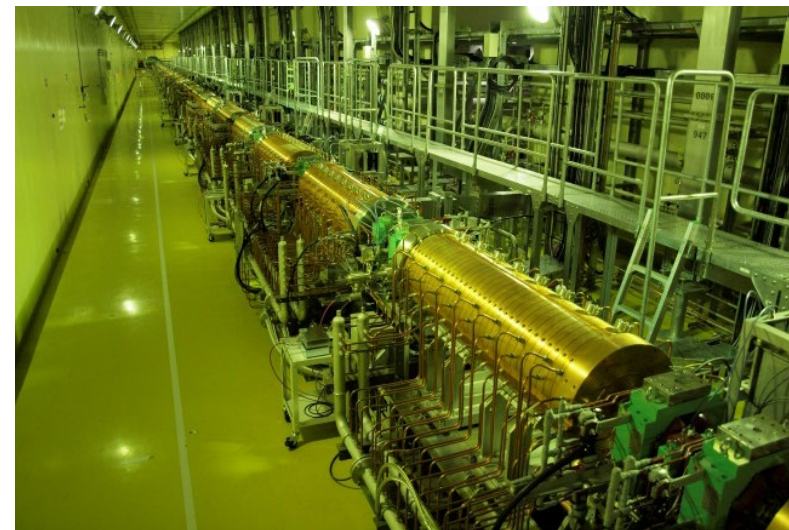
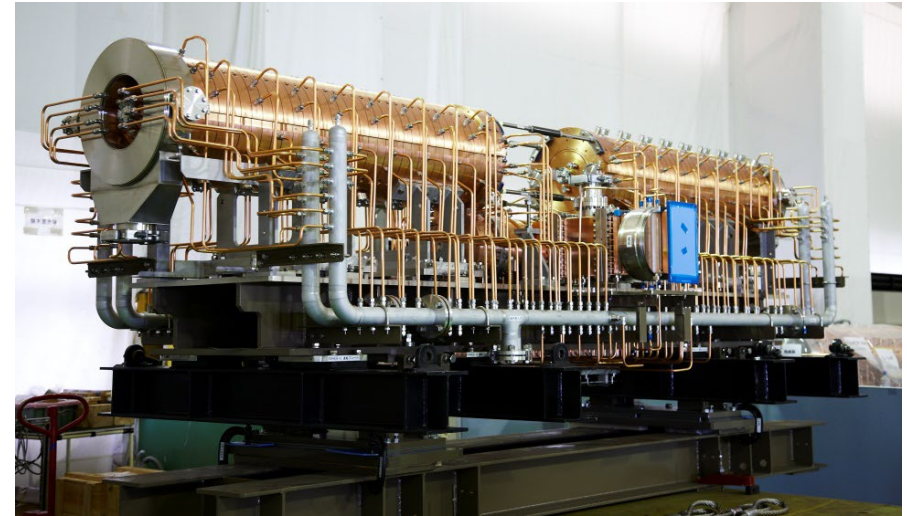
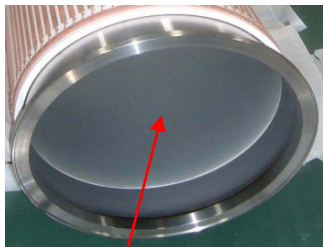


Photo courtesy of JAEA/KEK/J-PARC

6.1 CERAMICS CHAMBER

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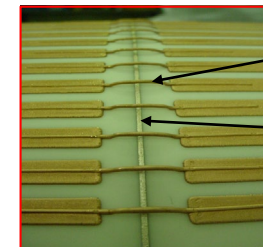
Courtesy of JAEA/KEK/J-PARC



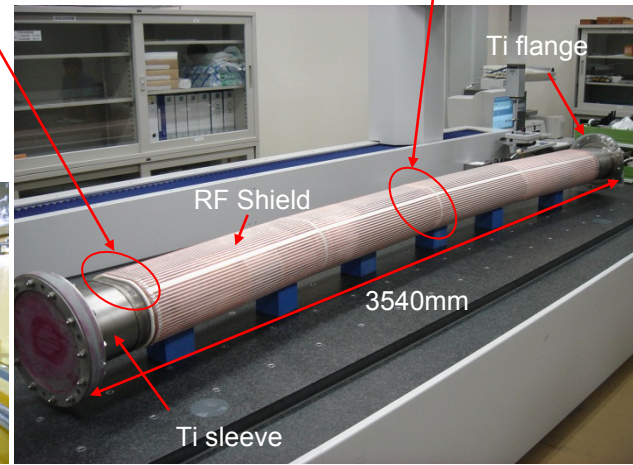
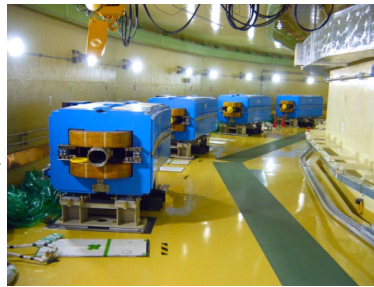
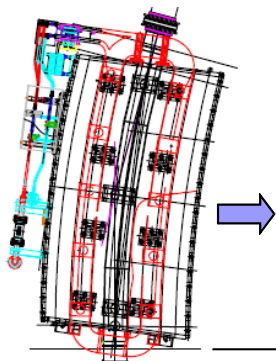
TiN coating
Thickness: 15nm



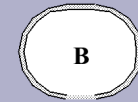
Capacitor
Capacitance : 330nF



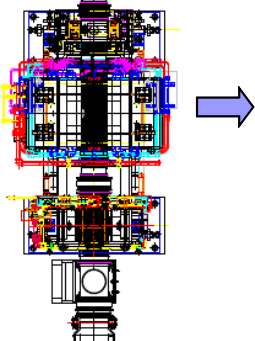
Every stripes are jumped over the joint area.
Brazing joint



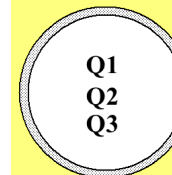
Dipole Magnets



Inner size (mm)	187 x 245
Length (mm)	3500
Shape	15° bend

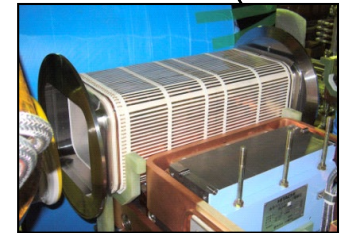
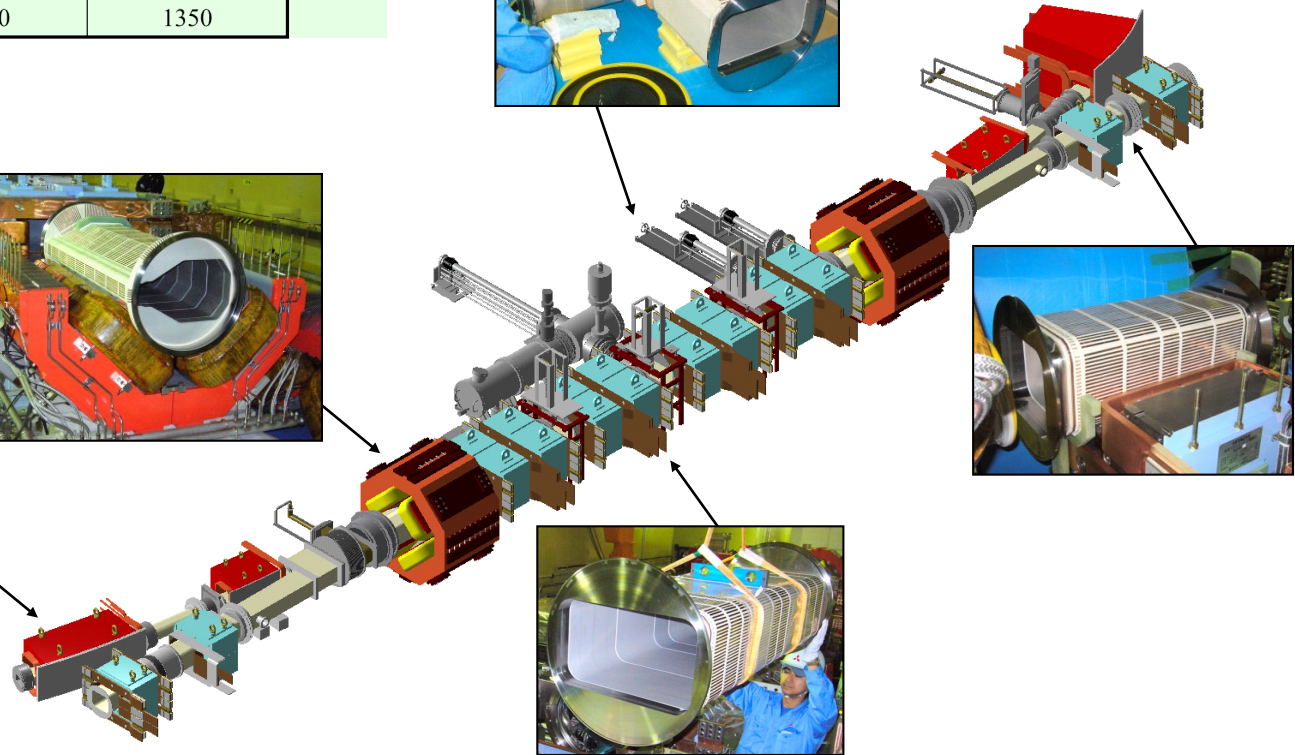
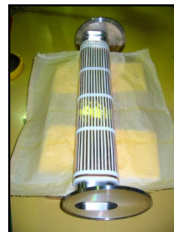
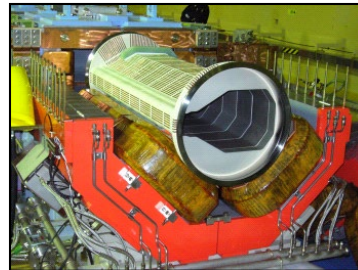
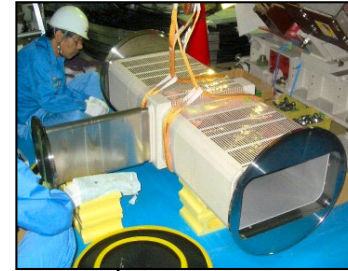
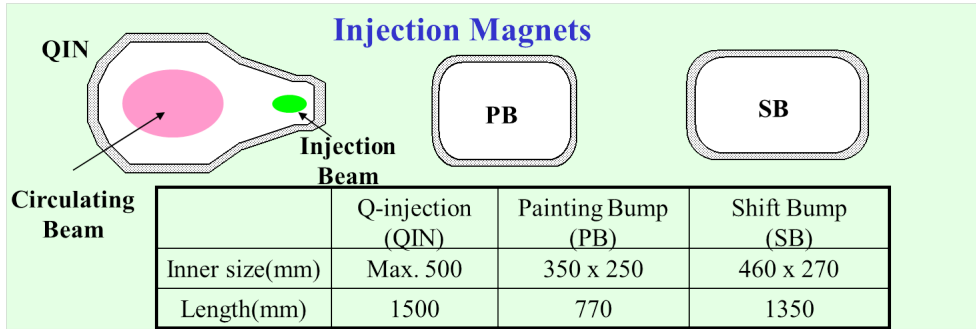


Quadrupole Magnets

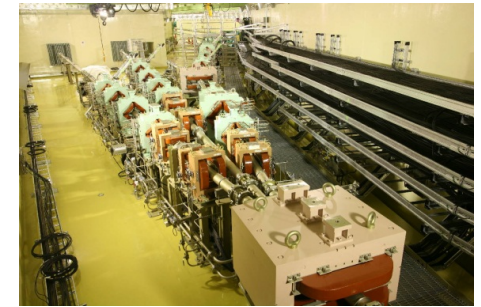
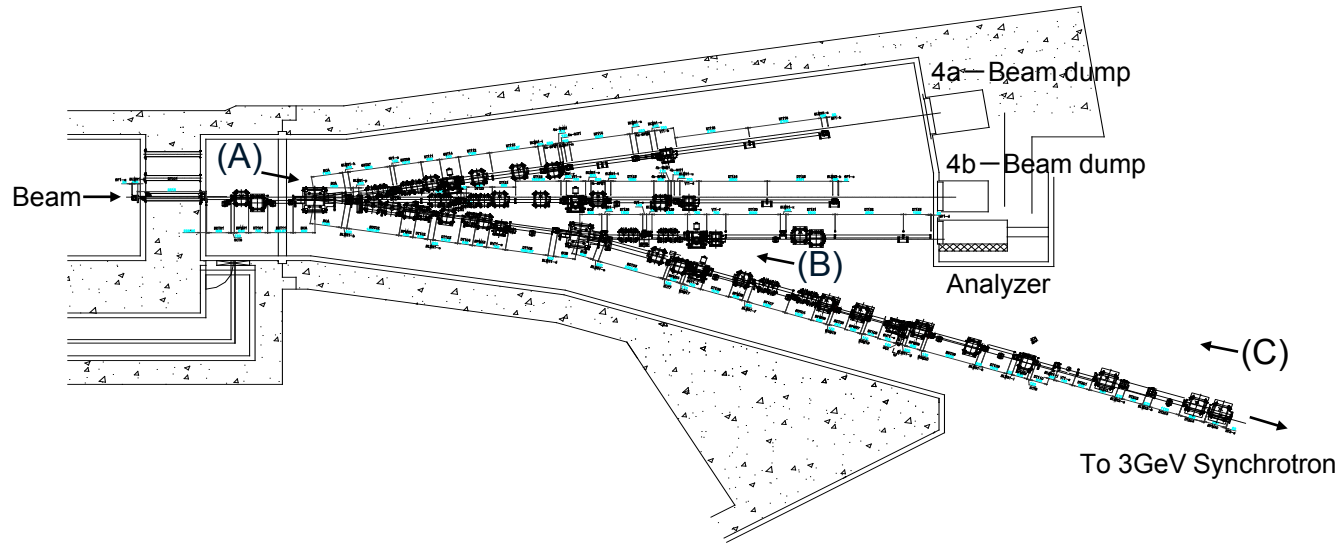


	Q1	Q2	Q3
Inner dia. (mm)	377	297	257
Length (mm)	1500	1600	1300

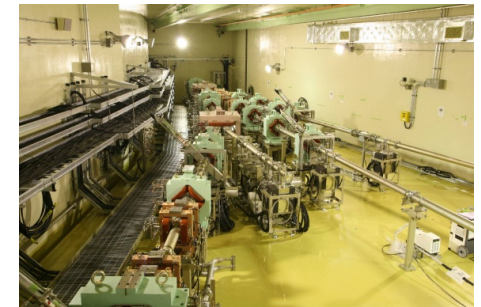
6.2 CERAMICS CHAMBER



7. BEAM MATCHING SYSTEM



(A)



(B)

Main Parameters	
Beam	H ⁻
Beam Energy	400MeV
Structures	Magnet System: 54 sets Vacuum System: 4 sets Ti Vacuum Duct: 80m



Power Supply



(C)

8. MAGNETIC ALLOY LOADED RF CAVITY



Photo courtesy of JAEA/KEK/J-PARC

Main Parameters	
Frequency	1.6 ~ 3.4 MHz
Accelerating Voltage	20 kV/gap
Input Power	1 MW(peak)
Q-value	10 ~ 30
Length	2.3 m
Weight	7 ton (dry)
Delivery Number	9 Modules



Photo courtesy of JAEA/KEK/J-PARC

9.1 INPUT COUPLER (DTL)

Main Parameters

Frequency	324MHz
Input Power	1MW, 600 μ sec, 50pps
Coupling	Variable (Movable Loop)
Window Type	Disk Alumina (99.7%)
Waveguide	Input / WX-203D Cavity side / WX-152D
Cooling	Water
Length	~1.0 m

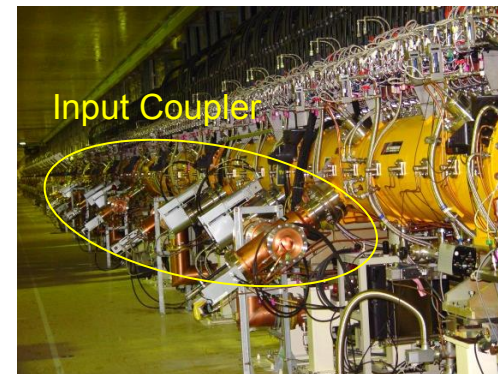
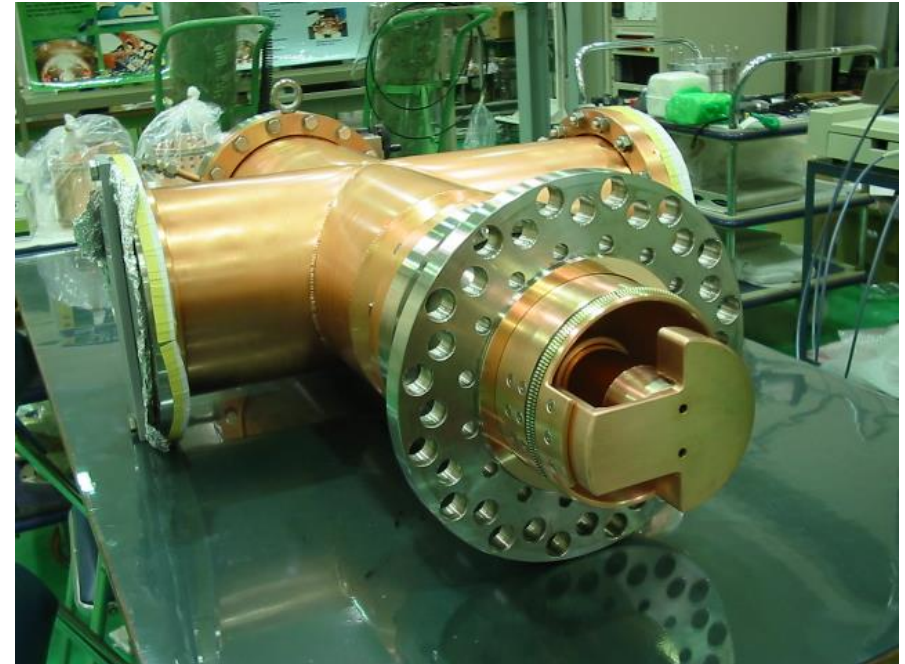
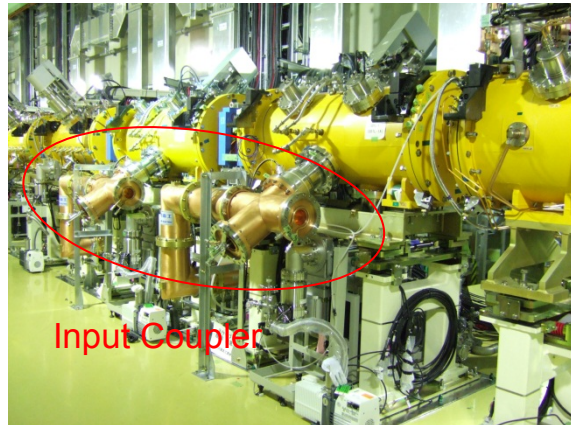


Photo courtesy of JAEA/KEK/J-PARC

9.2 INPUT COUPLER (SDTL)



Input Coupler

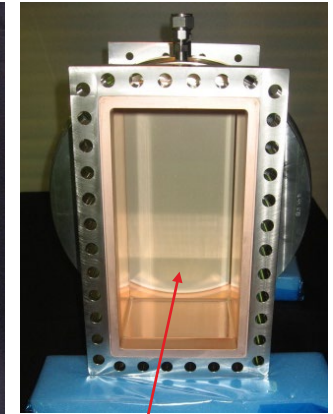
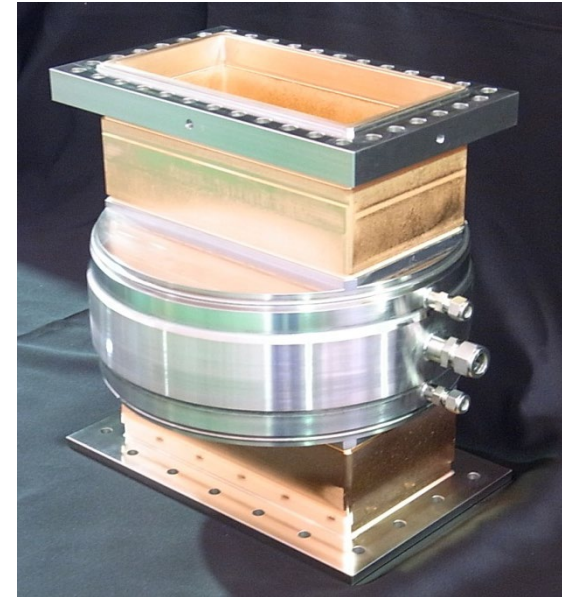
Main Parameters

Frequency	324MHz
Input Power	1MW, 600 μ sec, 50pps
Coupling	Variable (Rotation)
Window Type	Coaxial Disk Alumina (95%)
Waveguide	Input / WX-203D Cavity Side / WX-152D
Cooling	Water
Length	~1.0 m

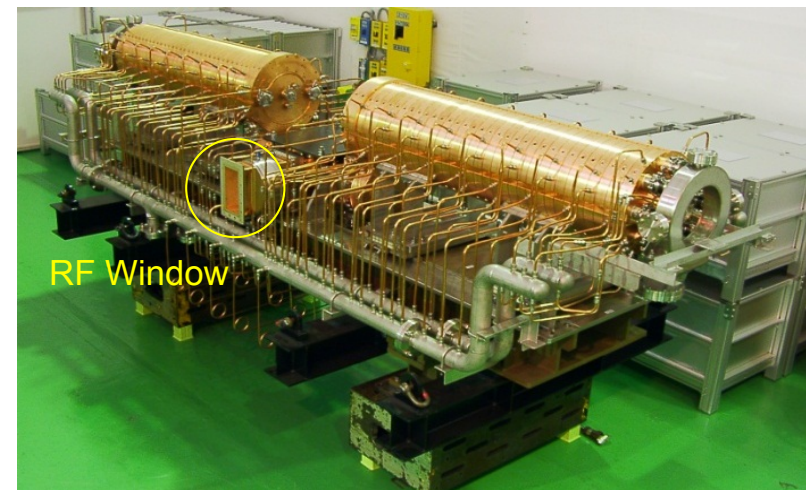
10. RF WINDOW (ACS)

Main Parameters

Frequency	972MHz
Input Power	2MW, 600 μ sec, 50pps
VSWR	<1.2
Window type	Disk Alumina (95%)
Waveguide	WR975
Cooling	Water
Length	35cm



TiN coating



RF Window

MOVE THE WORLD FORWARD

**MITSUBISHI
HEAVY
INDUSTRIES
GROUP**