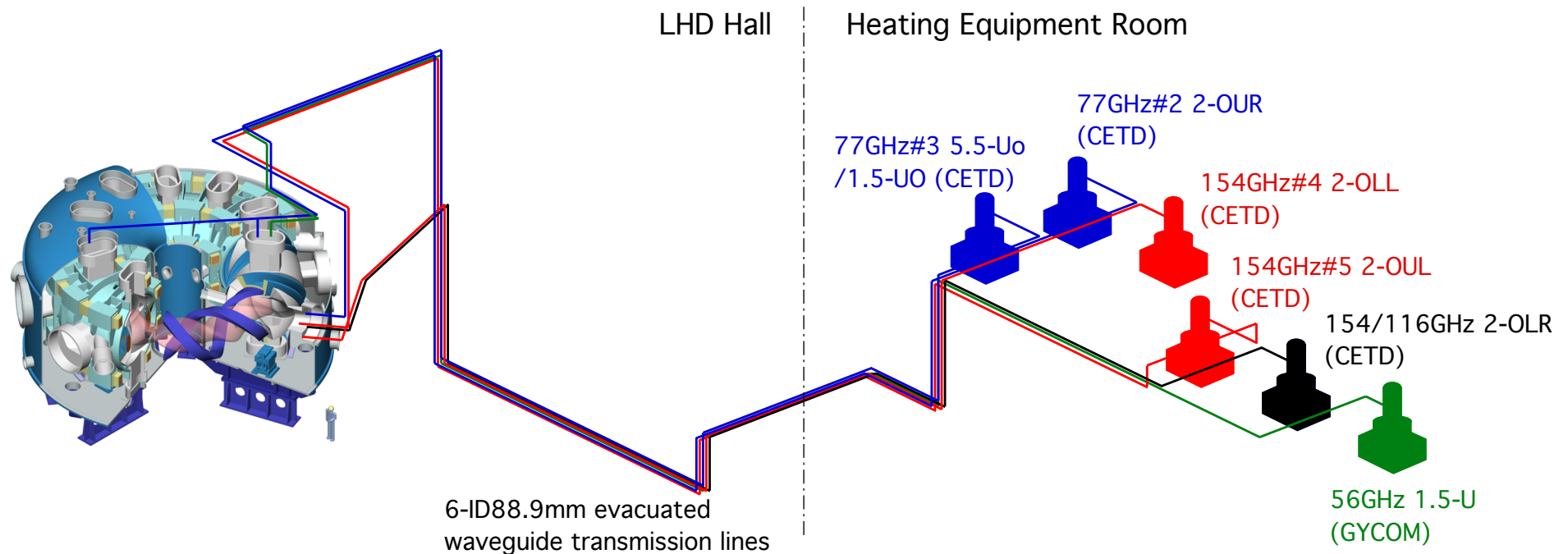


ECH system as a platform in NIFS



Existing gyrotrons:

Two 77GHz-1MW gyrotrons for 2.75T and 1.375T

Two 154GHz-1MW gyrotrons for 2.75T

One 154 & 116GHz-1MW dual frequency gyrotron for 2.75T, 2.07T, and 1.38T

One 56GHz-0.4MW gyrotron for 2.0T and 1.0T

Specification of 77 and 154 GHz gyrotrons



Items	Design
Frequency	77GHz / 154GHz
Power/ Pulse length	~1MW for up to 2s < 0.3MW for CW
Cavity mode	TE _{18,6} / TE _{28,8}
Tube type	Triode
Collector type	Collector potential depression
Output window	CVD diamond

High voltage power supplies of ECH system

Three sets of Toshiba PS

Each of Toshiba PSs furnishes

Collector DC PS: 66kV, 126A for pulse and 42A for CW

Anode DC PS: 50kV, 50mA

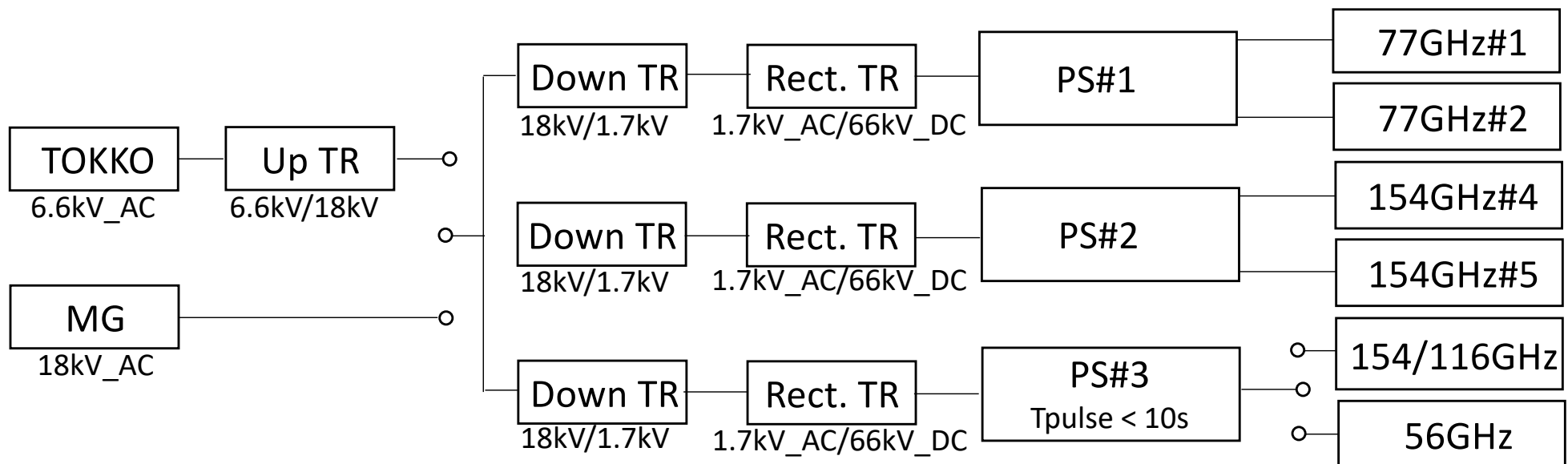
Body DC PS: 90kV, 100mA

Heater AC PS: 50V, 10A

One Nisshin PS

Collector DC PS: 91kV, 50A for 10s and 25A for CW

Toshiba PS system in LHD 23rd experiment



Six evacuated waveguide transmission lines, >100m each

Components:

88.9mm inner diameter corrugated waveguide

Miterbend (standard, power monitor, polarizer, arc detector)

Switch

Gate valve

Vacuum window

Pumpout tee

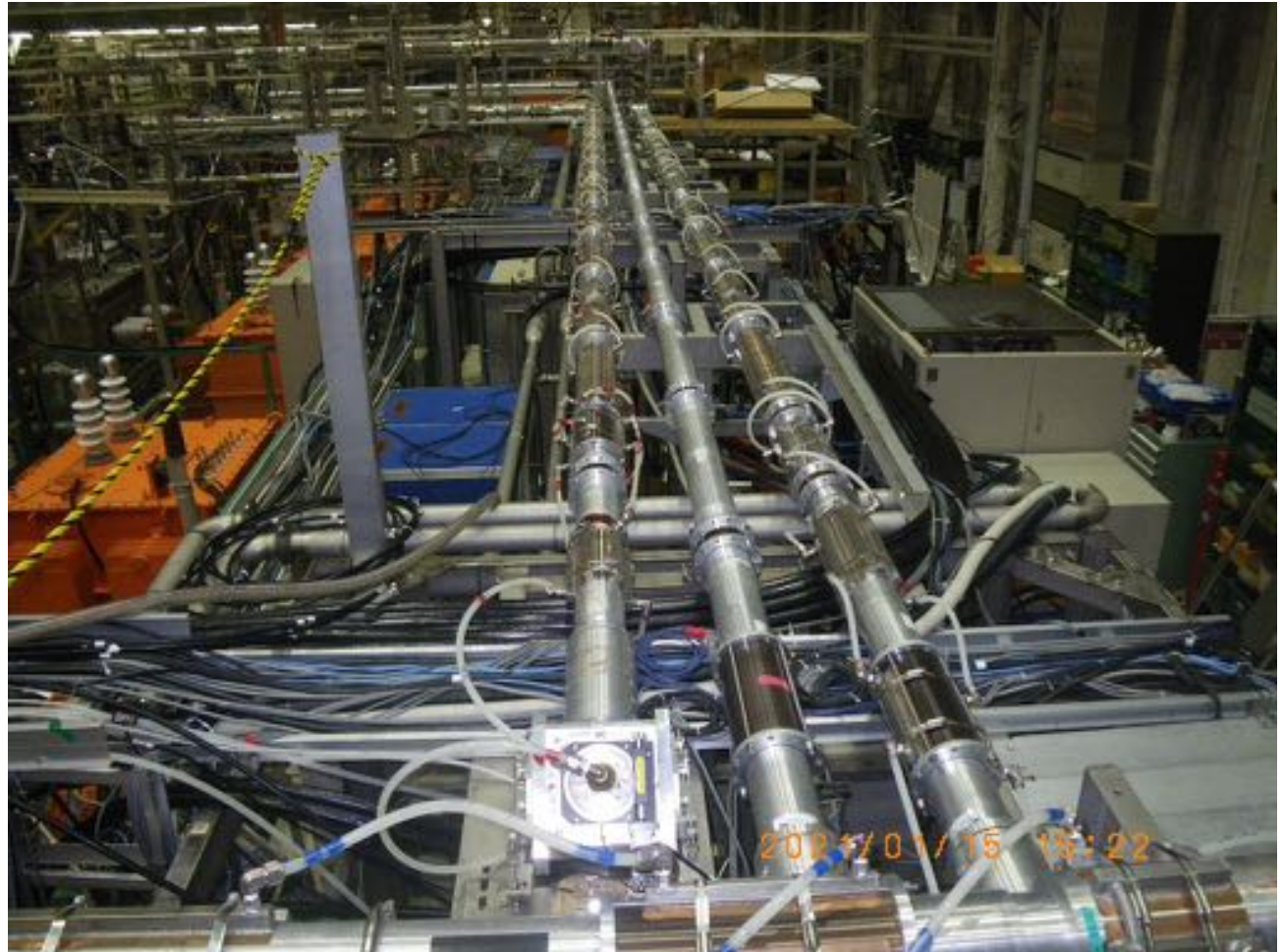
Sliding section

Insulating section

Dummy load

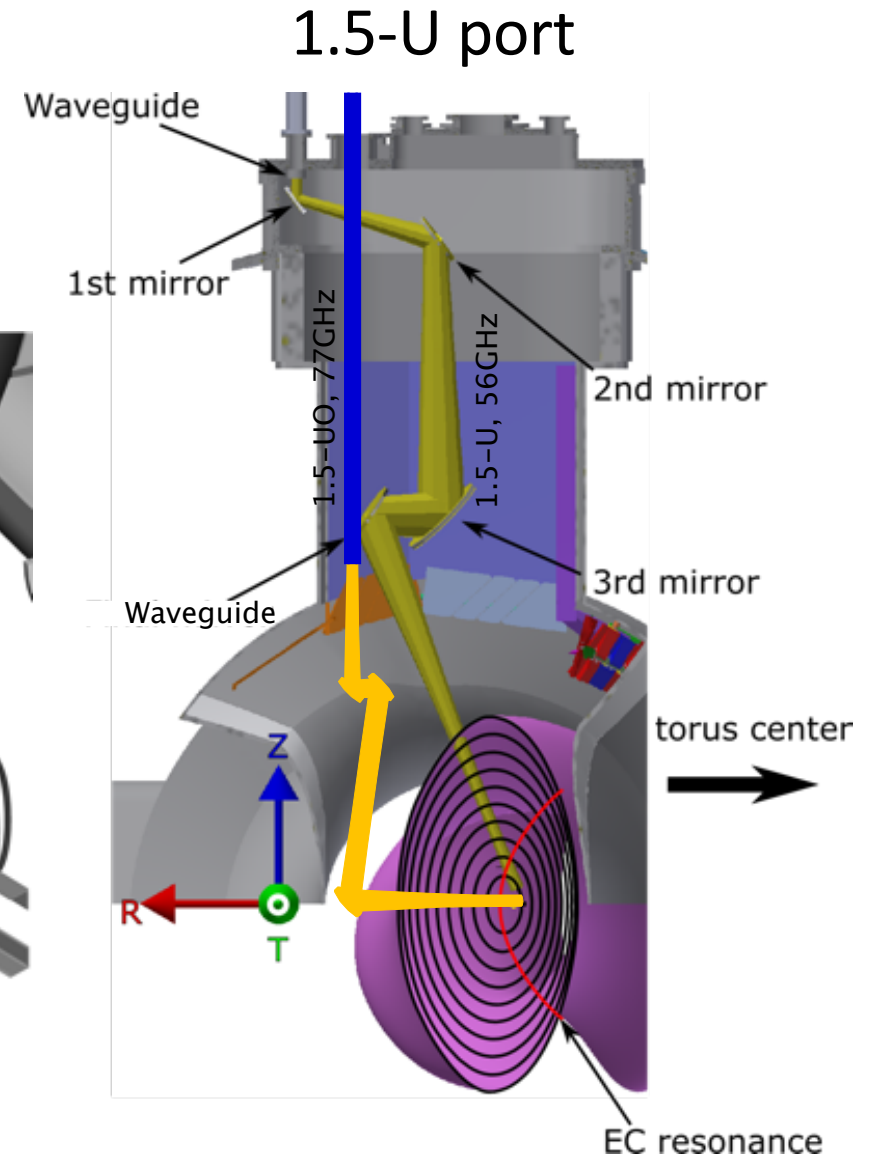
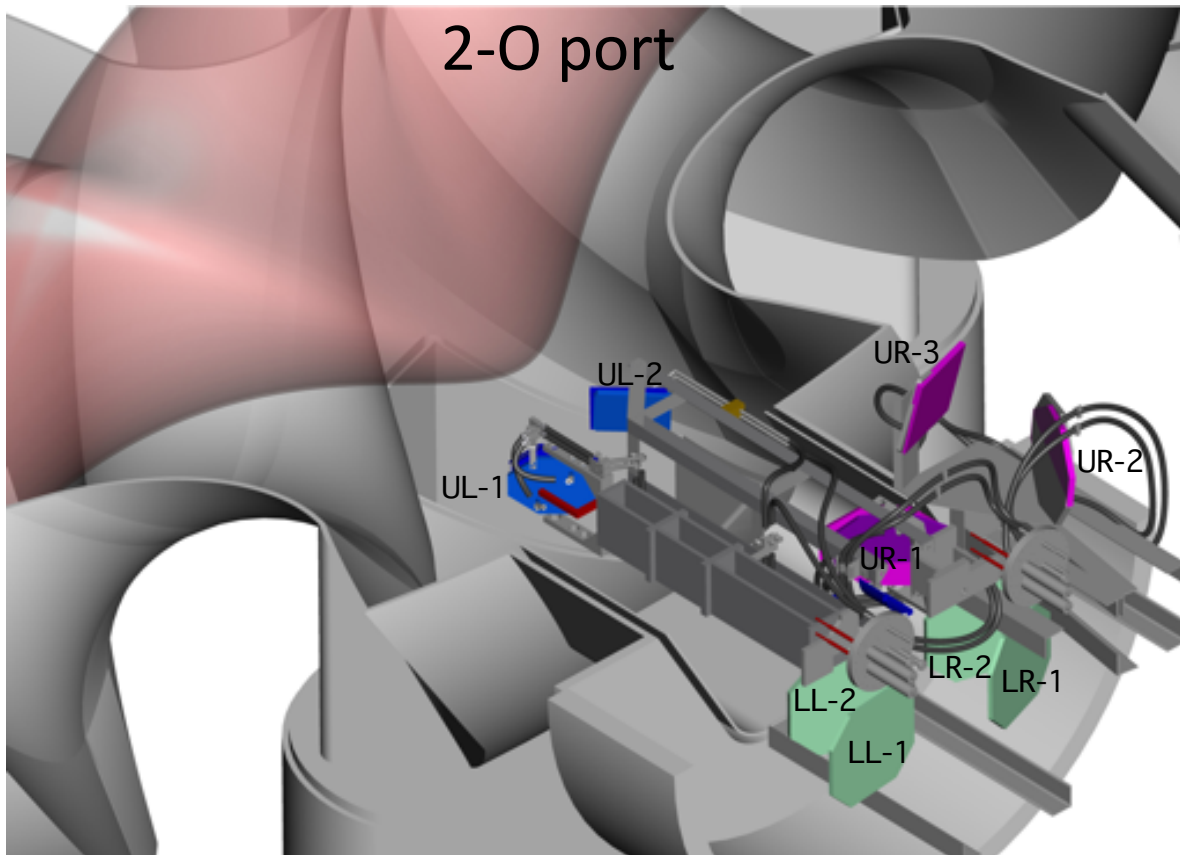
Turbopump

Cooling jacket



Seven power injection antenna systems on LHD

- 77GHz#1: 5.5-Uout (R scan) or 1.5-UO (fixed)
 - 77GHz#2: 2-OUR
 - 154GHz#4: 2-OLL
 - 154GHz#5: 2-OUL
 - 154/116GHz: 2-OLR
 - 56GHz: 1.5-U (R scan)
- } wide range of beam directions in toroidal and vertical directions



Possible research themes with, and applications of the ECH platform

Research and development of high-power long-pulse gyrotrons

Research and development of high-power millimeter wave transmission components

Research of wave heating and wave physics, including vortex waves

Research and development of Corrective Thomson Scattering (CTS) measurement
and analysis

CTS measurement in possible normal conducting (NC) LHD

Electron heating of possible NC-LHD plasmas by applying 14GHz or 28GHz oscillator

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