THE RF-SYSTEM FOR A HIGH CURRENT RFQ AT IHEP

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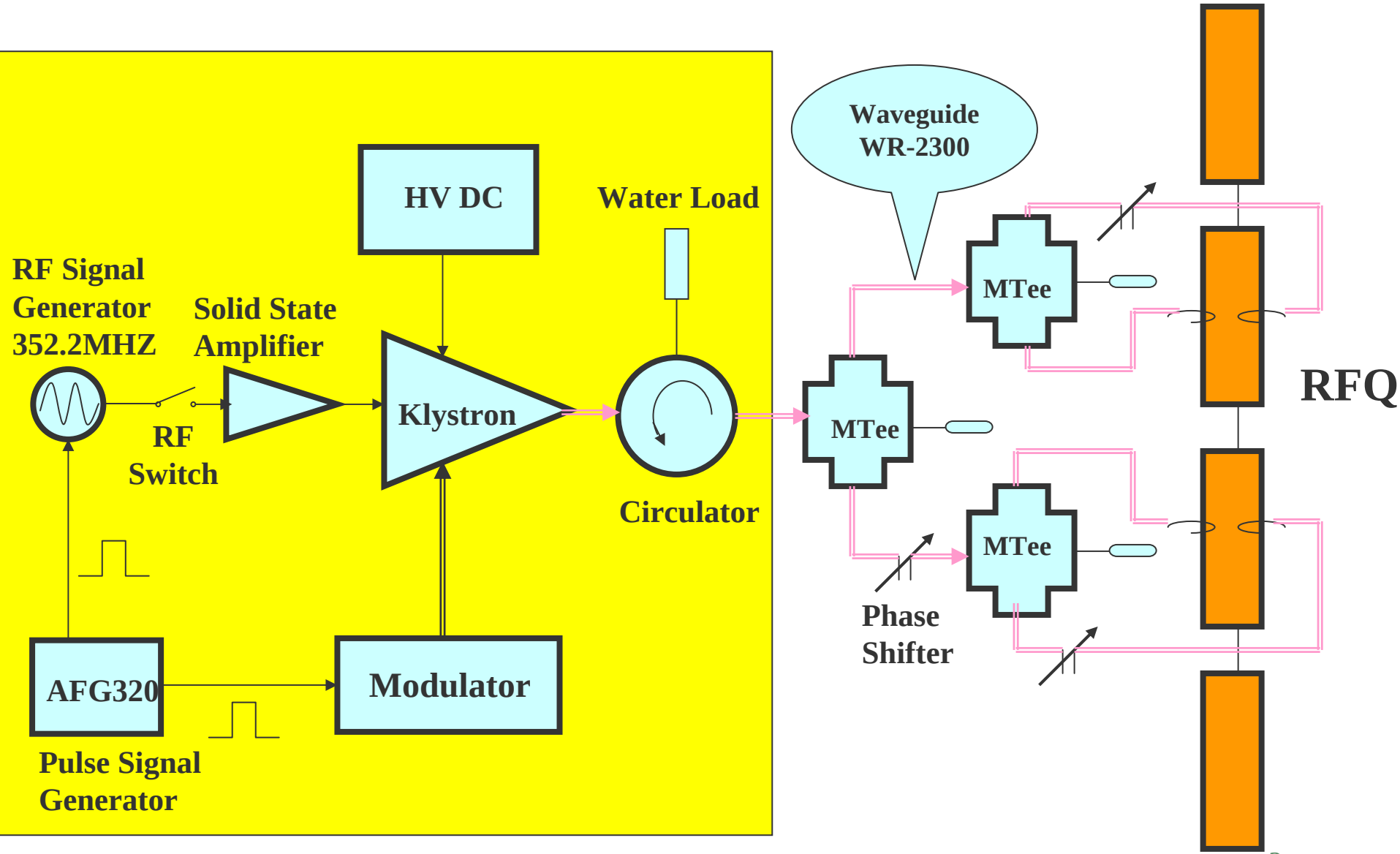
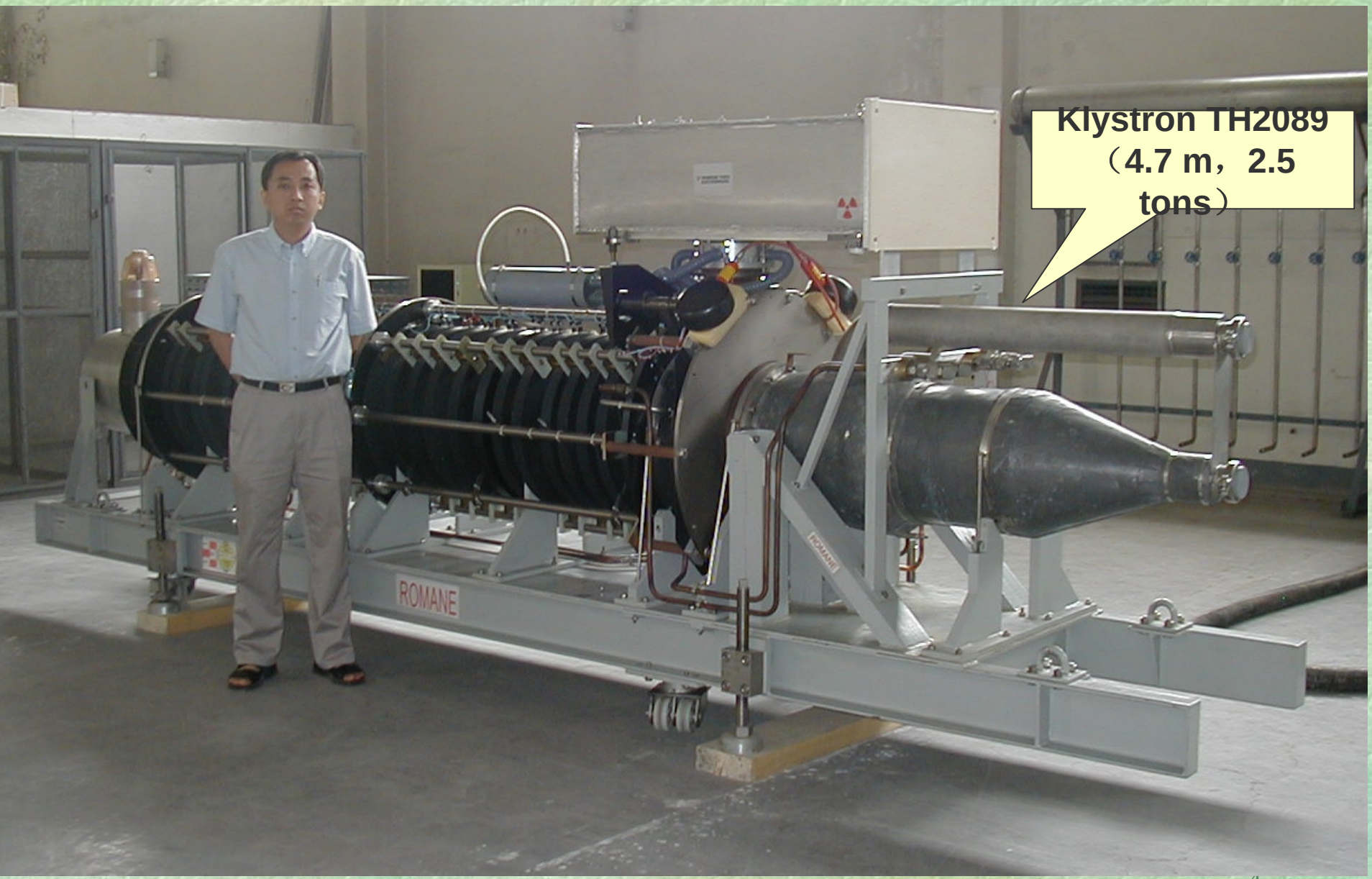
1 . Design Features of the RFQ

Frequency	352.2MHz
Beam Energy	3.5MeV
Peak Beam Current	60mA
Repeat Frequency	50 Hz
Beam Pulse Width	1.2 ms
Beam Duty Factor	6%
Peak Dissipated Power	452.561KW
Peak Beam Power	210KW
Peak RF Power Consumption	662.561KW
RF Pulse Width	1.4 ms
RF Duty Factor	7%
Total Peak RF Power	861KW

2. RF System for RFQ



Klystron and its Power Supply



1 KV Circuit Breaker

Step-down Transformers Tank (TR1 and TR2)

Rated Power: 2 × 1500KVA

Primary Voltage (Line to Line):

10KV r.m.s., 50Hz

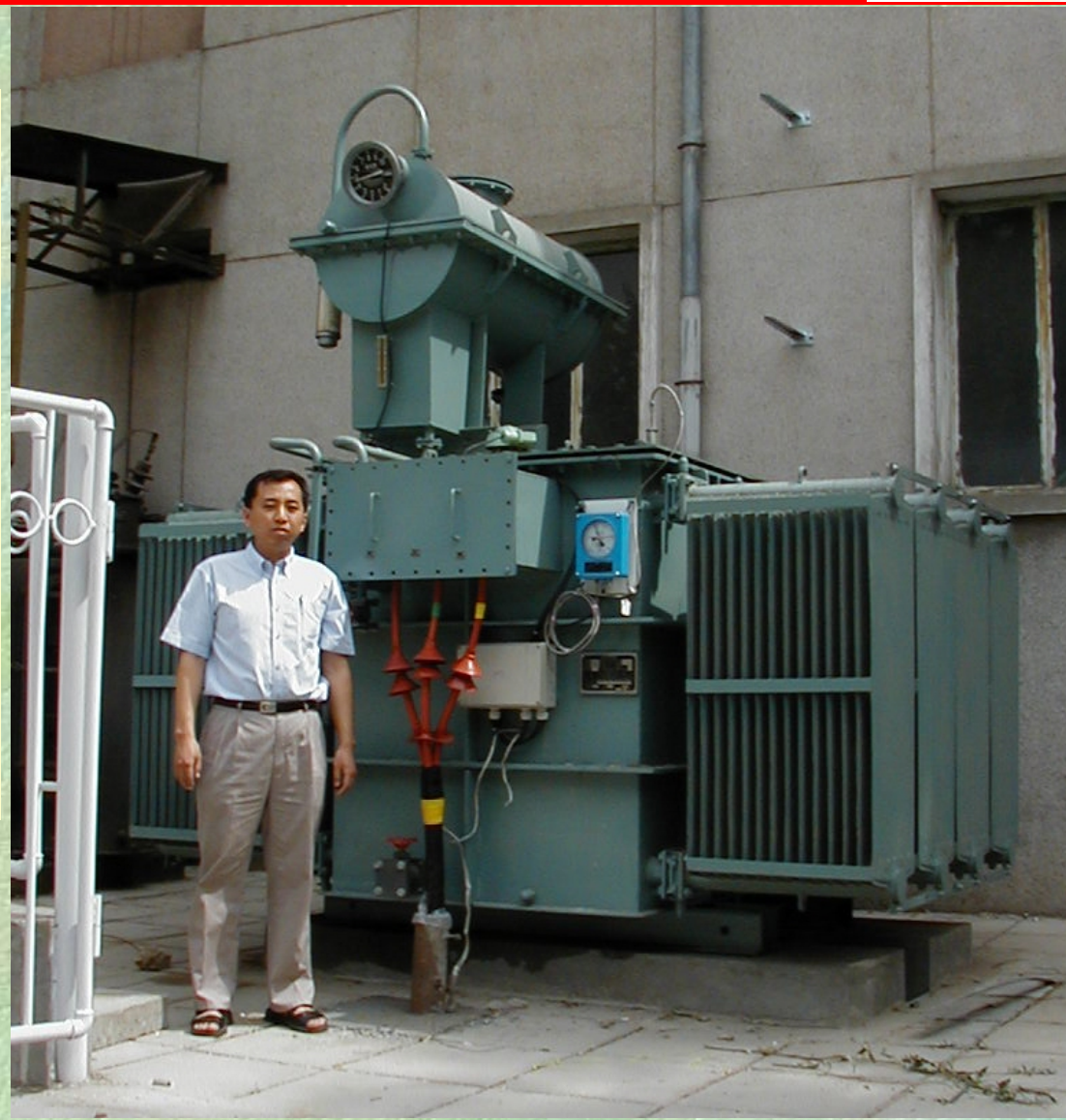
Secondary Voltage (Line to Line):

1KV r.m.s.

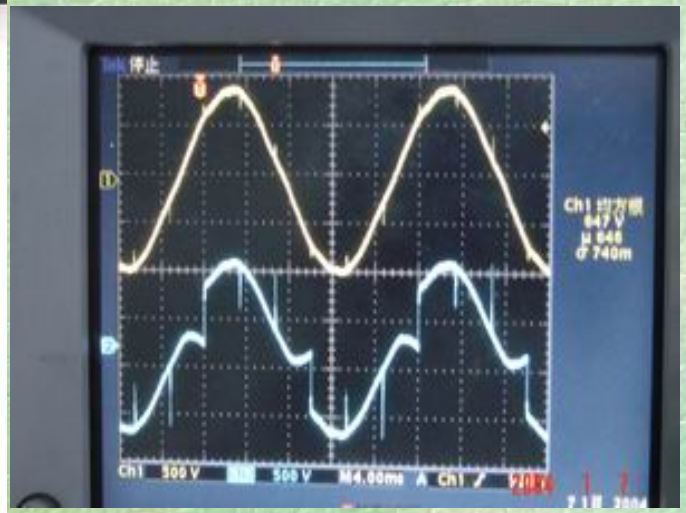
Cooling Type: ONAN

Vector Group TR1: Dyn 11.5

Vector Group TR2: Dyn 0.5



The power converter can provide 0 to 100KV continuously variable output voltage..

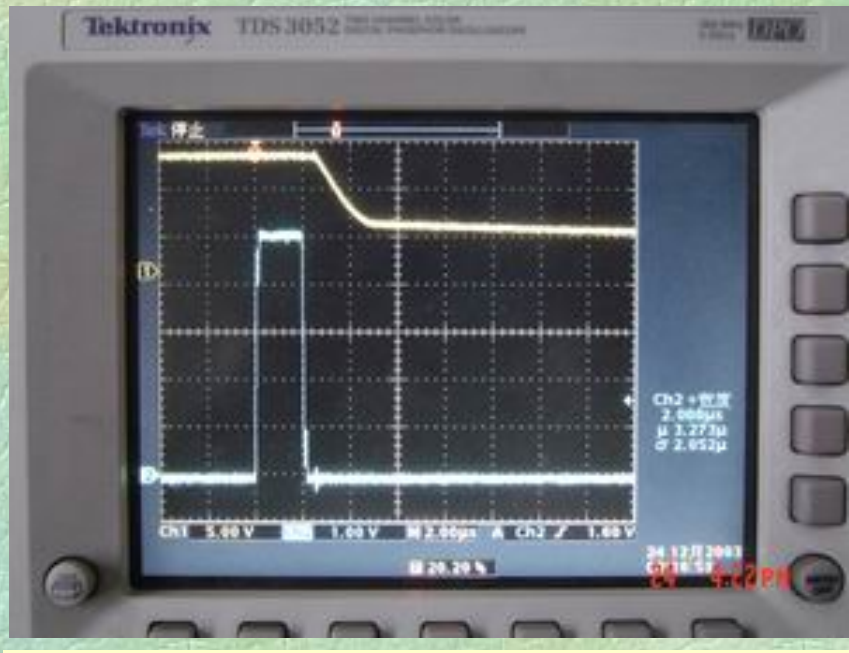


Input and output voltage of thyristor AC line controller


Diode Rectifier /Filter Chokes Tank (18 tons)
High Voltage Transformers Tank (40 tons)

Thyratron Crowbar and capacitors

Thyratron crowbar .The key component in it is the eight-gap thyratron CX2098B made by EEV Company.



Simulated overcurrent signal and control signal for switching off the thyristor AC line controller

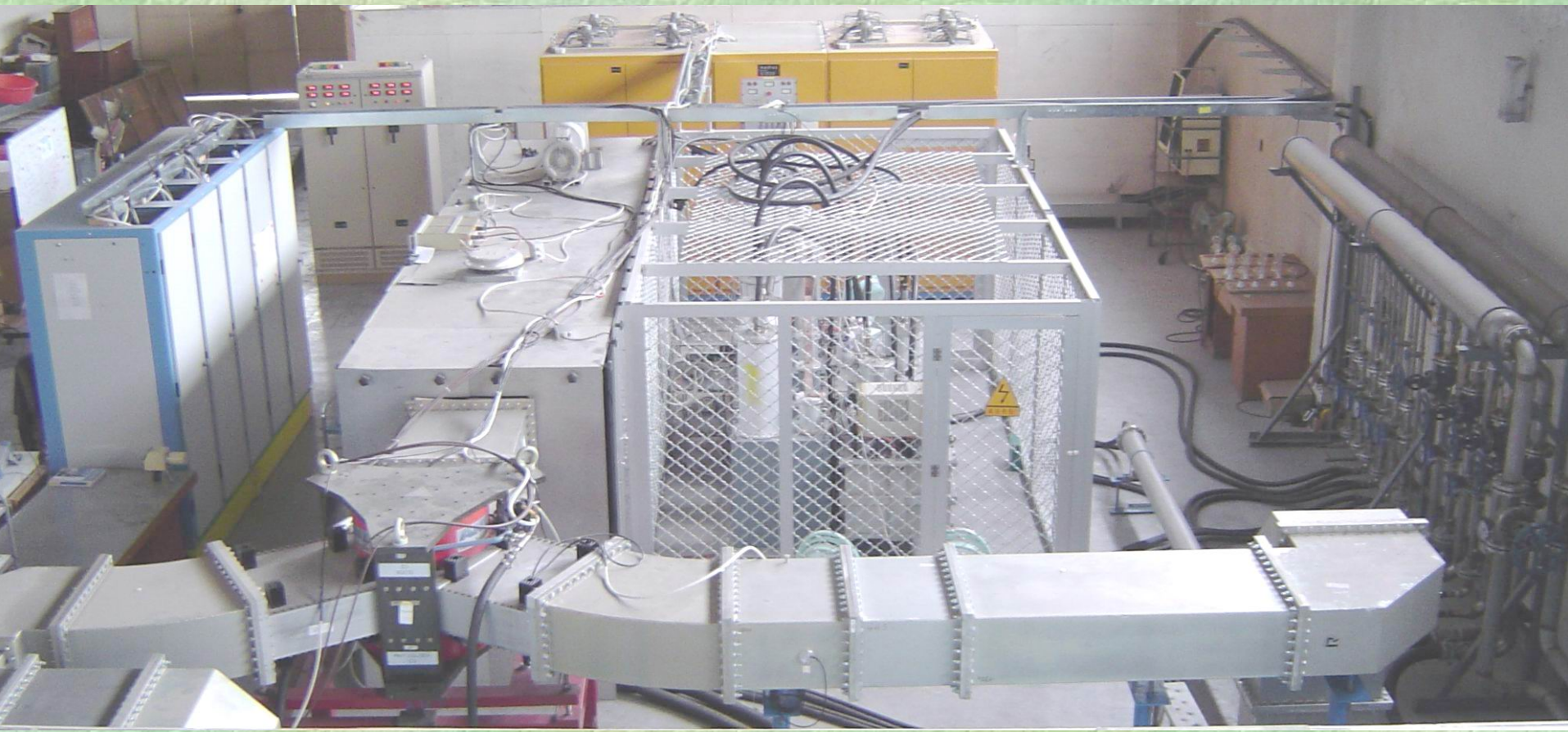
Standard Control Racks

Y-Junction-Waveguide-Circulator

Frequency	352.2 MHz
Bandwidth[20dB]	± 8 MHz
Forward Power	≤ 1.3 MW
Insertion Loss	≤ 0.15 dB
Isolation	≥ 20 dB
Return Loss	≥ 20 dB

300KW Water Load

Whole source system has been set up.



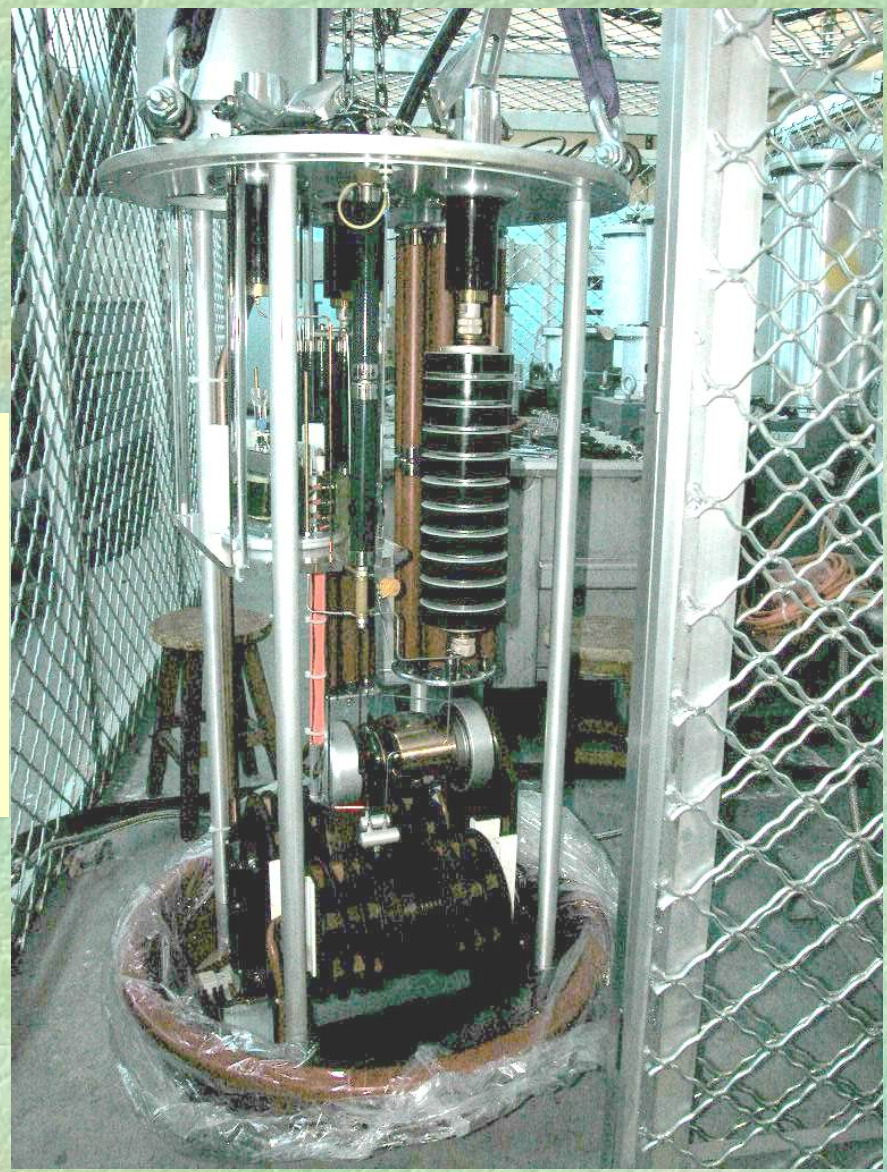
3, R&D of Long Pulse Modulator

The modulator's parameters are:

Output pulse width: up to 3ms.

Duty factor: 1% ~ 10%, continuously adjustable.

Output peak voltage with respect to the cathode: ⩽62KV.



4, Status of klystron power conditioning

Because the klystron given by CERN was a used and ever repaired tube, which stopped and stored up for four years, so we must recondition it again. However, due to high storage energy of capacitor bank, only one capacitor, instead of four, is connected in parallel into HV power supply for the first step of power conditioning in order to protect the klystron.

At present, the initial high power conditioning of the klystron is carried out, and output power can reach up to 334 kW at 62 kV in CW mode and 402 kW at 66.5 kV in pulse mode. Next step, it will take us long time to raise conditioning power to reach nominal value. And at last, all of four capacitors will be used, and high RF power will be applied to RFQ cavity next year.

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THANK YOU

FOR YOUR ATTENTION !