Status of RF system for the JAERI Energy-Recovery Linac FEL

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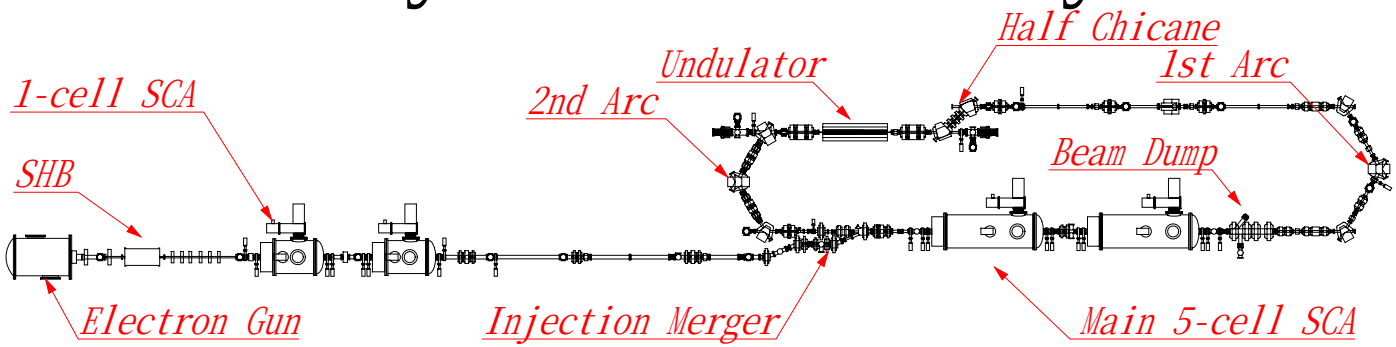
JAERI

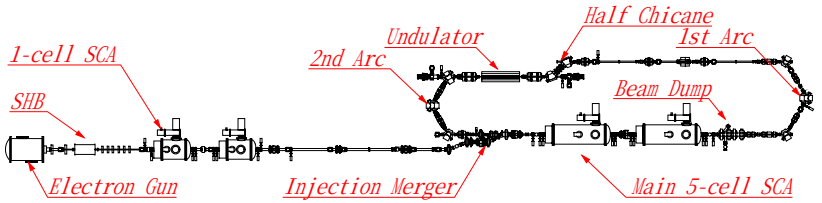
History of JAERI RF System



- All-Solid-State Amplifier
  - 1990 4kW Pulse for SHB (83.3MHz)
  - 1991 6kW Pulse for Single-Cell SCA (499.8MHz)
  - 1992 50kW Pulse for 5-Cell SCA (499.8MHz)

- IOT
  - 2002 50kW CW for Single-Cell SCA (499.8MHz)
  - 2004 50kW CW for 5-Cell SCA (499.8MHz)

Layout of the JAERI ERL-FEL

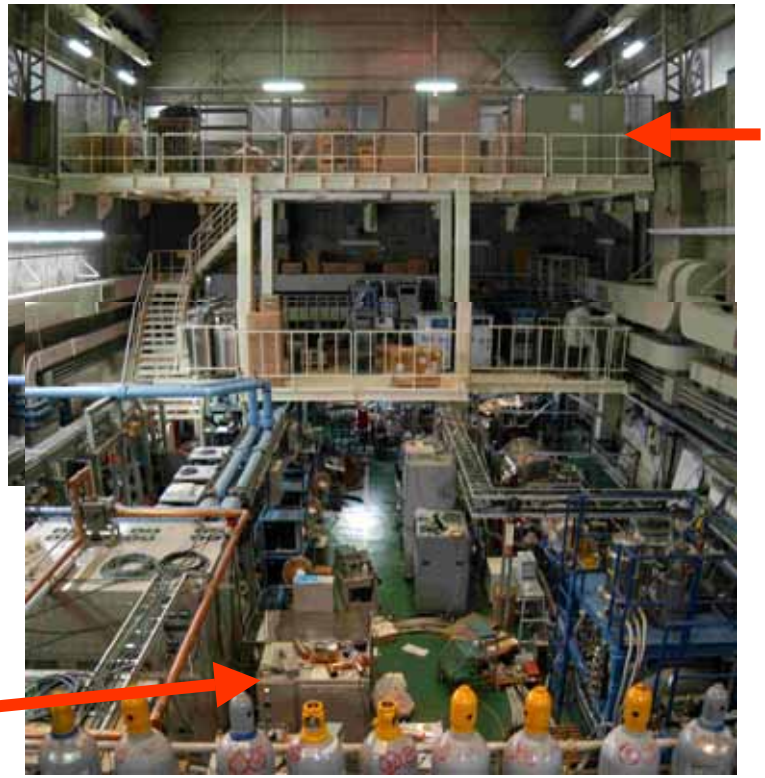


before

6kW All-Solid-State Amp

50kW All-Solid-State Amp

50kW IOT



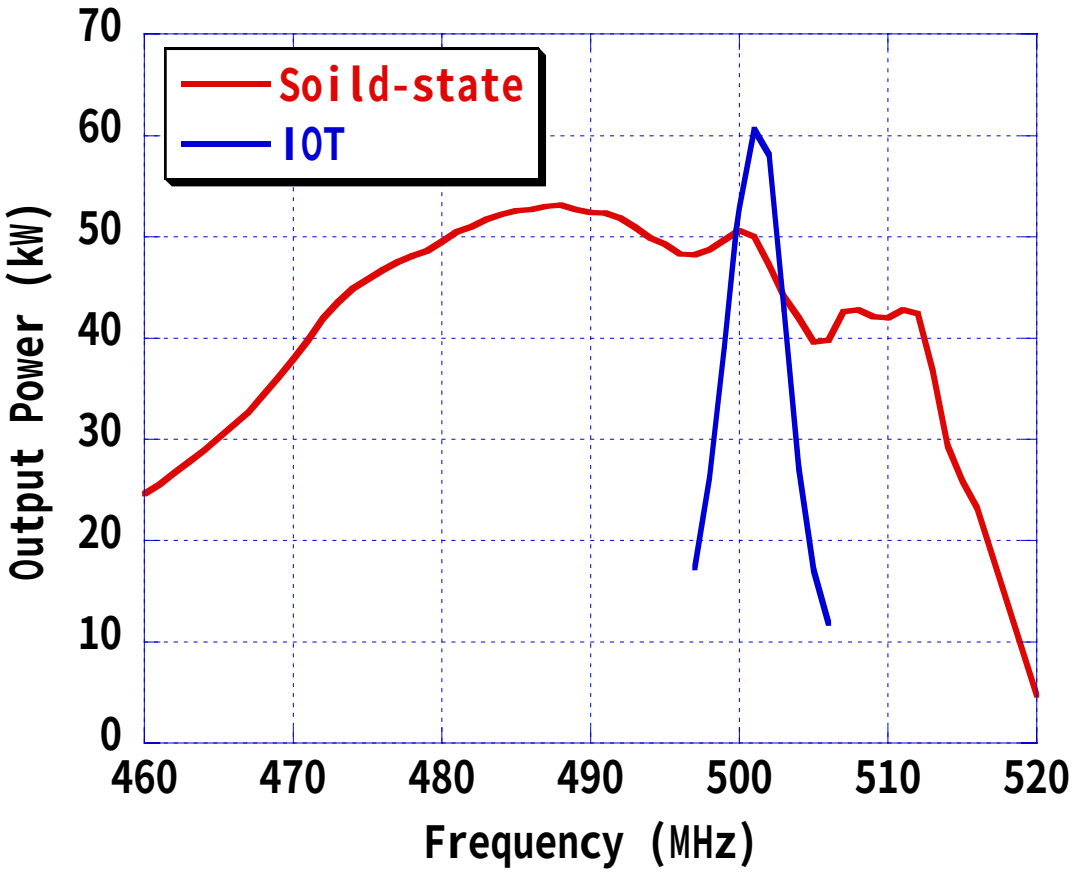
HV for
50kW IOT

now

Breakdown

- All-Solid-State Amplifier
  No Major breakdown for Amplifier Modules
  Minor breakdown
    -discharge in Power Combiners
    -matching resistance burnout
    -DC power source failure for control unit
- IOT
  Critical failure
    -ceramic crack during tuning

Bandwidth



Bandwidth

All-Solid-State 55MHz

IOT 6.5MHz

Cost for 500MHz RF Source

	Pulse	CW
All-Solid-State	~¥70M JPY ~$0.7M	~200M JPY ~$2M
IOT		~26M JPY ~$0.26M

100 JPY=$1

IOT Solid

Tube$0.05M*35+$0.26 ~ $2M

No of replacement

Conclusion

- All-Solid-State merits
  - Wide bandwidth
  - little critical failure
- IOT merits
  - Low cost
  - High efficiency