

ENTRY NO. C70 Date October 3, 1995
 Name of Machine Oak Ridge Isochronous Cyclotron ORIC
 Institution ORNL Holifield Radioactive Ion Beam Facility HRIBF
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HISTORY

MILESTONE DATES:
 Design 1958 Model Tests 1958-59
 Construction 1958-1962 First Beam 1963
 DESIGN/CONSTRUCTION BY:
 in house X other
 COST: Accelerator \$23M (1960) Facility \$90M total \$ 1995
 FUNDED BY: DOE

STATUS

STAFF: Machine for ORIC
 Scientists 1 Engineers 3
 Technicians 4 Students DOE
 Research (in house/external)
 Scientists / Engineers /
 Technicians / Students /
 BUDGET: Machine part of \$5M Funded by DOE
 Research Funded by
 TIME DISTRIBUTION:
 Basic Research (in house/external) % / %
 Applied Program (in house/external) % / %
 Maintenance % Development %

MAGNET

POLE PARAMETERS:
 Diameter 193 cm R_{extract} 77 cm R_{inject} cm
 HILL PARAMETERS: Gap (min) 19 cm B_{max} 2.37 T
 (@ 1,600,000 AT) Gap (max) 71 cm B_{min} 1.40 T
 VALLEY PARAMETERS: Gap (min) cm B_{max} T
 (@ AT) Gap (max) cm B_{min} T
 AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ T $\langle B \rangle_{\text{max}}$ 1.92 T
 NUMBER OF SECTORS: compact/separated 3 /
 sector angle deg. spiral (max) 30 deg.
 FIELD TRIMMING: Trim Coils 10 pairs
 Harmonic Coils 3 pairs per valley
 Other 1 pair per valley for flutter
 CURRENT: Main Coils 5000 Amps Stability 2×10^{-5}
 Trim Coils 800 each Amps Stability 2×10^{-4}
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 200 tons Conductor 9 tons
 ION ENERGY: Bending Limit $E/A = 105$ q²/A² MeV/u
 Focusing Limit $E/A = 75$ q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
 Description: single 180 degree dee
 No. of Gaps/turn 2 dE/dn(max) 0.16 MeV/q
 Voltage (max) 0.080 MV Harmonic f_r/f_{ion} 1.3
 Freq 6.7 to 20.1 MHz Power in(max) 0.20 MW
 Stability: Phase +/- 1 degree Voltage +/- 40V
 OTHER CAVITIES (Flattopping or otherwise):
 Description:
 Region of Influence: R_{min} cm R_{max} cm
 No. of Gaps/turn dE/dn(max) MeV/q
 Voltage (max) MV Harmonic f_r/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 1×10^{-6} Torr
 PUMPS: (No. and type) two 80-cm and one 50-cm
 oil diffusion pumps

ION SOURCE(S)

Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a) Internal Penning			H and He gas
(b)			
(c)			
(d)			

INJECTION SYSTEM

Internal Ion Source Efficiency %

EXTRACTION SYSTEM

One electrostatic deflector Efficiency 65 %
 Two magnetic channels

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μ A)	
		Internal	External
(a) Protons	60	6	2
(b) H, D, 4He	25	6	2
(c) 3He	44	6	2
(d)			

Secondary Particles	E (MeV)	part/sec
(a)		
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:

For μ A of MeV/u ions
 $\Delta E/E$ % $\Delta\phi$ °
 $\epsilon_n = \beta\gamma\epsilon$ x π mm mrad z π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: m² Moveable m²

Target Stations: No. Served At Same Time:

MAGNETIC SPECTROMETERS:

OTHER FACILITIES:
 ORIC is used as a driver for a RIB facility

REFERENCES/NOTES

(a)
 (b)

PLAN VIEW OF FACILITY, COMMENTS

Have completed three-year reconfiguration and construction period to develop a radioactive ion beam facility with ORIC as a driver accelerator producing radioactive atoms and the 25URC 25MV tandem as a RIB accelerator. ORIC is being developed to produce 50 uA beams.