

ENTRY NO. C63 Date August 10, 1995
 Name of Machine INDIANA UNIVERSITY CYCLOTRON FACILITY
 Institution Indiana University
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 In Charge: John Cameron, Director Reported by: G.W. East

HISTORY

MILESTONE DATES:

Design 1966 Model Tests 1967-1972
 Construction 1968-1974 First Beam Sept. 1975
 DESIGN/CONSTRUCTION BY:
 in house YES other Various Fabrication Vendors
 COST: Accelerator \$5 x 10⁶ Facility \$11 x 10⁶
 FUNDED BY: National Science Foundation (NSF)

STATUS

STAFF: Machine

Scientists 16 Engineers 12
 Technicians 36 Students 4
 Research (in house/external)
 Scientists 46 / 250 Engineers 0 /
 Technicians 0 / Students 50 / 25
 BUDGET: Machine \$10 x 10⁶ Funded by NSF
 Research Funded by

TIME DISTRIBUTION:

Basic Research (in house/external) 35. % / 35. %
 Applied Program (in house/external) 1. % / 2. %
 Maintenance 20. % Development 7. %

MAGNET

POLE PARAMETERS:

Diameter N/A cm R_{extract} 330 cm R_{inject} 101 cm
 HILL PARAMETERS: Gap (min) 7.6 cm B_{max} 1.65 T
 (@ 150,000 AT) Gap (max) 7.6 cm B_{min} 1.65 T
 VALLEY PARAMETERS: Gap (min) ∞ cm B_{max} < 0.02 T
 (@ 150,000 AT) Gap (max) ∞ cm B_{min} < 0.02 T
 AVERAGE FIELD: _{min} 0.058 T _{max} 0.64 T
 NUMBER OF SECTORS: compact/separated N/A / 4
 sector angle 36 deg. spiral (max) N/A deg.
 FIELD TRIMMING: Trim Coils 21 Gradient
 Harmonic Coils 4 Axial, 4 Radial
 Other NONE
 CURRENT: Main Coils 1000 Amps Stability 1 x 10⁻⁶
 Trim Coils 950 Amps Stability 1 x 10⁻⁵
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 2000 tons Conductor 10 tons
 ION ENERGY: Bending Limit E/A = 215 q²/A² MeV/u
 Focusing Limit E/A = 215 q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: 2 1/2 Wave RF Resonators
 No. of Gaps/turn 4 dE/dn(max) 0.80 MeV/q
 Voltage (max) 0.2 MV Harmonic f_{rf}/f_{ion} 3-7; 11-14
 Freq 25-35.5 MHz Power in(max) 150 MW
 Stability: Phase 0.25 RF Degrees Voltage 8 x 10⁻⁵

OTHER CAVITIES (Flattopping or otherwise):

Description: NONE
 Region of Influence: R_{min} cm R_{max} cm
 No. of Gaps/turn dE/dn(max) MeV/q
 Voltage (max) MV Harmonic f_{rf}/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 3 x 10⁻⁶ TORR
 PUMPS: (No. and type) 4 Cryogenic, 2 Diffusion Pumps

ION SOURCE(S)

Type	Intensity (mA)	@ (mm mrad)	ε _n = βγc (π mm mrad)	Ion Species
(a) Anal Pol	0.008	20.0		P, d (80% Pol.)
(b) Duoplasmatron	0.300	< 10.0		P, d, H ⁺ , ³ He, ⁴ He
(c) AB (ECR) Pol				P, d, ²⁴ He
(d)				

INJECTION SYSTEM

Midplane Injection Radial Inflector Efficiency 75 %

EXTRACTION SYSTEM

Electrostatic & Magnetic Septums Efficiency 99 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)	
		Internal	External
(a) H ⁺ & Pol. H ⁺	20-205	5.0	5.0
(b) d & Pol. d	10-50	2.0	2.0
(c) ³ He	8-95	1.0	1.0
(d) ⁴ He	7-50	1.0	1.0

Secondary Particles	E (MeV)	part/sec
(a) n & Pol. n	20-205	10 ⁶
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:

For 5.0 μA of ALL MeV/u ALL ions
 ΔE/E 0.1 % Δφ 4.0 °rf
 ε_n = βγc x 1.5 π mm mrad z 1.5 π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 4600 m² Moveable m²
 Target Stations: 8 No. Served At Same Time: 2
 MAGNETIC SPECTROMETERS: K600 High Resolution
 OTHER FACILITIES: QOSP PION Spectrometer, 3.6 TM
 Synchrotron Storage Ring with Electron Cooling
 Neutron Beam Swinger & PNF TOF Facilities
 Proton Radiation Therapy Facility

REFERENCES/NOTES

(a) 1994 IUCF Scientific and Technical Report
 (b) The IUCF Cooler, R.E. Pollock, IEEE Trans. NUCL Sci., NS-30, No. 4 P2056 (1983)

PLAN VIEW OF FACILITY, COMMENTS

