

ENTRY NO. C72 Date 25-AUG-92  
 Name of Machine 60" Cyclotron  
 Institution Brookhaven National Laboratory  
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 In Charge: A. P. Wolf Reported by: D. J. Schlyer

**HISTORY**  
**MILESTONE DATES:**  
 Design 1963 Model Tests 1963  
 Construction 1964 First Beam 1968  
**DESIGN/CONSTRUCTION BY:**  
 in house XX other  
**COST:** Accelerator 400,000 Facility 950,000  
**FUNDED BY:** USAEC-DOE

**STATUS**  
**STAFF:** Machine  
 Scientists 1 Engineers  
 Technicians 2 Students  
 Research (in house/external)  
 Scientists 2 / 0 Engineers /  
 Technicians / Students /  
**BUDGET:** Machine Funded by DOE-NIH  
 Research Funded by DOE-NIH  
**TIME DISTRIBUTION:**  
 Basic Research (in house/external) 95 % / 5 %  
 Applied Program (in house/external) % / %  
 Development % Maintenance 5 %

**MAGNET**  
**POLE PARAMETERS:**  
 Diameter 152 cm R<sub>extract</sub> 65 cm R<sub>inject</sub> 0 cm  
**HILL PARAMETERS:** Gap (min) cm B<sub>max</sub> T  
 (0 AT) Gap (max) cm B<sub>min</sub> T  
**VALLEY PARAMETERS:** Gap (min) cm B<sub>max</sub> T  
 (0 AT) Gap (max) cm B<sub>min</sub> T  
**AVERAGE FIELD:** < B ><sub>min</sub> 1 T < B ><sub>max</sub> 1.54 T  
**NUMBER OF SECTORS:** compact/separated 3 /  
 sector angle deg. spiral (max) 50 deg.  
**FIELD TRIMMING:** Trim Coils 8  
 Harmonic Coils 5  
 Other  
**CURRENT:** Main Coils 1200 Amps Stability  
 Trim Coils 300 Amps Stability  
 Stored Energy (cryogenic) MJ  
**WEIGHT:** Iron 196 Tons Conductor Cu hollow  
**ION ENERGY:** Bending Limit E/A = q<sup>2</sup>/A<sup>2</sup> MeV/u  
 Focussing Limit E/A = q/A MeV/u

**ACCELERATION SYSTEM**  
**FUNDAMENTAL ACCELERATION:**  
 Description: 1 DEF, 1 DUMMY DEF @ 180°  
 No. of Gaps/turn 2 dE/dn(max) 0.120 MeV/q  
 Voltage(max) 0.060 MV Harmonic f<sub>r1</sub>/f<sub>ion</sub> 1.3  
 Freq MHz Power in(max) 0.100 MW  
 Stability: Phase Voltage  
**OTHER CAVITIES (Flattopping or otherwise):**  
 Description:  
 Region of Influence: R<sub>min</sub> cm R<sub>max</sub> cm  
 No. of Gaps/turn dE/dn(max) MeV/q  
 Voltage(max) MV Harmonic f<sub>r1</sub>/f<sub>ion</sub>  
 Freq MHz Power in(max) MW  
 Stability: Phase Voltage

**VACUUM SYSTEM**  
 OPERATING PRESSURE: 1 x 10<sup>-5</sup> Torr  
 PUMPS: No. and type 1 - Diffusion 24"

**ION SOURCE(S)**  
 Type Intensity (mA)  $\Theta$   $\epsilon_n = \beta\gamma\epsilon$  (mm mrad) Ion Species  
 (a) hot filament H<sup>+</sup>  
 (b)  
 (c)  
 (d)

**INJECTION SYSTEM**  
 Efficiency %

**EXTRACTION SYSTEM**  
 Electrostatic Efficiency 10 %

**CHARACTERISTIC BEAMS**

	Accelerated Ions	E/A (MeV/u)	Current(part $\mu$ A)	
			Internal	External
(a)	H <sup>+</sup>	34	300	25
(b)	D <sup>+</sup>	23	300	20
(c)	He-3 <sup>++</sup>	56	200	10
(d)	He-4 <sup>++</sup>	46	200	10

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

**EXTRACTED BEAM PROPERTIES:**  
 For  $\mu$ A of MeV/u ions  
 $\Delta E/E$  %  $\Delta\phi$  °rf  
 $\epsilon_n = \beta\gamma\epsilon$  x  $\pi$ mm mrad z  $\pi$ mm mrad

**FACILITIES FOR RESEARCH**  
 SHIELDED AREA: Fixed 100 m<sup>2</sup> Moveable m<sup>2</sup>  
 Target Stations: 2 No. Served At Same Time: 1  
 MAGNETIC SPECTROMETERS:  
 OTHER FACILITIES:

**REFERENCES/NOTES**  
 (a)  
 (b)

**PLAN VIEW OF FACILITY, COMMENTS**