

**ENTRY No. 70**

NAME OF MACHINE CP-42 H<sup>-</sup> Cyclotron DATE Sept. 7, 1981  
 INSTITUTION THE CYCLOTRON CORPORATION  
 ADDRESS 950 Gilman St., Berkeley, California, U.S.A.  
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 IN CHARGE G. O. Hendry REPORTED BY T. Y. T. Kuo

**HISTORY AND STATUS**

DESIGN, date Mid. 1977 Model tests  
 ENG DESIGN, date Mid. 1977  
 CONSTRUCTION, date Mid. 1978  
 FIRST BEAM, date (or goal) July, 1979  
 MAJOR ALTERATIONS

COST, ACCELERATOR  
 COST, FACILITY, total  
 FUNDED BY

**ACCELERATOR STAFF, OPERATION AND DEVELOPMENT**

SCIENTISTS ENGINEERS  
 TECHNICIANS CRAFTS  
 GRAD STUDENTS involved during year  
 OPERATED BY Research staff or Operators  
 OPERATION hr/wk, On target hr/wk  
 TIME DISTR. in house %, Outside %  
 BUDGET, op & dev

**FUNDED BY****RESEARCH STAFF**, not included above

USERS, in house outside

GRAD STUDENTS involved during year

RESEARCH BUDGET, in house

**FUNDED BY****MAGNET**

POLE FACE, diameter (compact) 120 cm, R extraction 53 cm  
 R injection cm  
 GAP, min 5 cm, Field 24 kG }  
 max 12 cm, Field 16 kG } at 92,400  
 AVERAGE FIELD at R ext 18.4 kG } Ampere turns  
 B max/ <B> 1.3

NUMBER OF SECTORS { compact 3 } Spiral, max 64 deg  
 { separated }

SECTOR ANGLE (SSC) deg

TRIMMING COILS

CONDUCTOR, material and type Hollow Copper

STORED ENERGY (cryogenic) MJ

POWER: main coils 100 max, kW; current stability 10<sup>(-5)</sup>

trimming coils max, kW; current stability

WEIGHT: Fe 35 tons; coils 3 tons

COOLING system Recirculated Water

ION ENERGY (bending limit) E/A = 42 q<sup>2</sup>/a<sup>2</sup> MeV/amu

(focusing limit) E/A = q/a MeV/amu

**ACCELERATION SYSTEM**

DEES, number 2; angle 90 deg

BEAM APERTURE 1.8 cm; DC Bias 1.5 kV

TUNED by, coarse fine Capacitors, Trimmer

RF to 26.8 MHz, stable ± 0.5 kHz

Orb F to 26.8 MHz

HARMONICS, RF/Orb F, used 1

DEE - Gnd, max 35 kV, mirr gap 0.5 cm

STABILITY, (pk-pk noise)/(pk RF volt) 10<sup>(-4)</sup>

ENERGY GAIN, max 100 kV/turn

RF PHASE, stable to ± deg

RF POWER input, max 100 kW

FREQUENCY MODULATION, rate /s

modulator, type

beam pulse, width

**VACUUM SYSTEM**

OPERATING PRESSURE 6x10<sup>-6</sup> H<sub>2</sub> Torr or mbar

PUMPS, No, Type, Size

Four 10-inches Diff. Pumps

**ION SOURCES**

PIG

**INJECTION SYSTEM****EXTRACTION SYSTEM**

Charge Exchange Foil

**FACILITIES FOR RESEARCH**

SHIELDED AREA, fixed m<sup>2</sup>; movable m<sup>2</sup>

TARGET STATIONS in rooms

STATIONS served at same time, max

MAG SPECTROGRAPH, type

COMPUTER model

OTHER FACILITIES

**CHARACTERISTIC BEAMS**

PARTICLE	ENERGY (MeV)		CURRENT (pA)	
	Goal	Achieved	Internal	External
H <sup>-</sup>	11-42	11-42	200	200 p

**SECONDARY** (part/s)**BEAM PROPERTIES**

MEASURED CONDITIONS

PULSE WIDTH 40 RF deg 200 pA of 42 MeV H<sup>-</sup> ions

PHASE EXC, max RF deg pA of MeV ions

EXTRACT eff 100 % pA of MeV ions

RESOL ΔE/E 1 % pA of MeV ions

EMITTANCE

(π mm. mrad) { 10 axial } pA of MeV ions  
 { 10 rad }

**OPERATING PROGRAMS**, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS

BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS (\*)

NEUTRON PRODUCTION(\*) \* Varied

**REFERENCES/NOTES**

G.O. Hendry et al. Design and Performance of a Compact H<sup>-</sup> Cyclotron, Proceedings of this Conference.

**PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS**

Five CP-42 cyclotrons are currently being installed at the following institutions:

1. M.D.Anderson Hospital and Tumor Institute, Houston, Texas, USA.
2. TRIUMF, University of British Columbia, Canada.
3. Amersham International Ltd., Amersham, England.
4. Mallinckrodt Inc., St. Louis, Missouri, USA.
5. Nuclear Research Centre, Karlsruhe, Federal Republic of Germany.