ENTRY No. 34

NAME OF MACHINE CYCLOTRON DATE OCTOBER 15, 1981

INSTITUTION PHYSICS DIVISION - JOINT RESEARCH CENTER (Operated by E.E.C.)

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IN CHARGE G. RICCOBONO REPORTED BY G. RICCOBONO

HISTORY AND STATUS

DESIGN, date Model tests

ENG DESIGN, date CONVENTIONAL

CONSTRUCTION, date CYCLOTRON SOLD by SCANDITRONIX A.B.

FIRST BEAM, date (or goal) MODEL MC 40

MAJOR ALTERATIONS

COST, ACCELERATOR 9×10^6 SKR

COST, FACILITY, total $9 \times 10^6 + 2 \times 10^6$ SKR (Excl. Bld.)

FUNDED BY E.E.C.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS /

TECHNICIANS 2 CRAFTS 3

GRAD STUDENTS involved during year 2

OPERATED BY .... Research staff or 2 Operators

OPERATION 38 hr/wk, On target 30 hr/wk

TIME DISTR. in house 100 %, Outside // %

BUDGET, op & dev //

FUNDED BY

RESEARCH STAFF, not included above

USERS, in house 3 outside

GRAD STUDENTS involved during year 5

RESEARCH BUDGET, in house $4 \cdot 10^5$ UCE = $4.8 \cdot 10^5$ $

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MAGNET

POLE FACE, diameter (compact) 135.0 cm, R extraction 50.0 cm

R injection / cm

GAP, min 10 cm, Field 21.2 kG
max 18 cm, Field 13.3 kG } at 118.000 Ampere turns

AVERAGE FIELD at R ext kG

B max/ <B>

NUMBER OF SECTORS { compact /// / separated /// } Spiral, max deg Entrance 41° Exit 56° A tR=50 cm

SECTOR ANGLE (SSC) deg

TRIMMING COILS 8 in number on each pole face

CONDUCTOR, material and type Hollow Copper

STORED ENERGY (cryogenic) // MJ

POWER : main coils 100 max, kW ; current stability 10^{-5} of Max
trimming coils max, kW ; current stability 10^{-5} of Max

WEIGHT : Fe 57.2 tons ; coils 2.4 tons

COOLING system Closed Loop Demineralized Water

ION ENERGY (bending limit) E/A = 40 q^2/a^2 MeV/amu
(focusing limit) E/A = 40 q /a MeV/amu

ACCELERATION SYSTEM

DEES, number 2 ; angle 90° deg

BEAM APERTURE 2 cm ; DC Bias // kV

TUNED by, coarse Moving Short fine Automatic Flaps

RF 12.5 to 27 mHz, stable $\pm 10^{-6}$

Orb F 25 to 54 mHz

HARMONICS, RF/Orb F, used 1 and 2

DEE - Gnd, max 44 kV, min gap 0.68 cm

STABILITY, (pk-pk noise)/(pk RF volt) ?

ENERGY GAIN, max 125 kV/turn

RF PHASE, stable to ± Better than 1° deg

RF POWER input, max 20 KW on each cavity kW

FREQUENCY MODULATION, rate /s

modulator, type //

beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 10^{-6} Torr or mbar

PUMPS, No, Type, Size 2 Turbomolecular Leybold Heraeus type 3500 h = 60 - Ø = 45 cm

ION SOURCES

Cold cathode P.I.G. with two chimneys for first and second harmonic acceleration

INJECTION SYSTEM

//

EXTRACTION SYSTEM

V_r = 1 , Electrostatic Deflector, Magnetic Channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 280 m² ; movable // m²

TARGET STATIONS 3 (+4) in 3 rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type //

COMPUTER model PDP 11 - 03 with HP 2240 A

OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
Protons	40	38	100	65
	40	38	60	30
Deuterons	20			
SECONDARY			(part/s)	

BEAM PROPERTIES

	MEASURED	CONDITIONS
PULSE WIDTH	RF deg	pμ A of MeV ions
PHASE EXC, max	RF deg	pμ A of MeV ions
EXTRACT eff	%	pμ A of MeV ions
RESOL ΔE/E	%	pμ A of MeV ions
EMITTANCE (π mm. mrad)	.110 axial, .97 rad	1 pμA of 30 MeV P ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS

BIOMEDICAL APPLICAT ISOTOPE PRODUCTIONS

Radiation damage in fusion reactors materials

REFERENCES/NOTES

The Cyclotron and related equipment have been assembled at the beginning of this year (1981). They are undergoing the acceptance tests. The experimental facilities are being built and will be installed next year.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS