ENTRY No. C5

NAME OF MACHINE CICLOTRON U. de CHILE DATE JUNE 1989
INSTITUTION FACULTAD DE CIENCIAS - UNIVERSIDAD DE CHILE
ADDRESS SANTIAGO, CHILE, CASILLA 653
TEL 2712865 Anexo 215 TELEX 240230 BOOTH CL NUCLEAR
IN CHARGE J.R. MORALES REPORTED BY J.R. MORALES

HISTORY AND STATUS

DESIGN, date 1960 1960 - 1964 Model tests 1962
ENG DESIGN, date
CONSTRUCTION, date 1960 - 1964
FIRST BEAM, date (or goal) 1962 (Davis) 1967 (Santiago)
MAJOR ALTERATIONS New design MS and RI

COST, ACCELERATOR $ 500,000
COST, FACILITY, total $ 300,000
FUNDED BY U. of Chile,

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 1
TECHNICIANS 1 CRAFTS 1
GRAD STUDENTS involved during year
OPERATED BY 1 Research staff or 1 Operators
OPERATION 50 hr/wk On target 40 hr/wk
TIME DISTR. in house 90 %, Outside 10 %
BUDGET, op & dev US $ 10.000
FUNDED BY Univ. of Chile

RESEARCH STAFF, not included above

USERS, in house 4 outside 3
GRAD STUDENTS involved during year 2
RESEARCH BUDGET, in house non fixed, about US $ 10.000
FUNDED BY U. of Chile, CONICYT

MAGNET

POLE FACE, diameter (compact) cm, R extraction cm
R injection cm
GAP, min cm, Field kG
max 4.4 cm, Field 19.7 kG
AVERAGE FIELD at R ext 19.7 kG } at $0.2.10^6$ Ampere turns
B max/ <B>
NUMBER OF SECTORS { compact 3 / separated } Spiral, max deg
SECTOR ANGLE (SSC) deg
TRIMMING COILS 1/sect.

CONDUCTOR, material and type Cu. pipes
STORED ENERGY (cryogenic) MJ
POWER : main coils 74 max, kW ; current stability 10^{-4}
trimming coils max, kW ; current stability
WEIGHT : Fe 50 tons ; coils 5 tons
COOLING system Destil. water
ION ENERGY (bending limit) E/A = q^2/a^2 MeV/amu
(focusing limit) E/A = q^2/a^2 MeV/amu

ACCELERATION SYSTEM

DEES, number 2 ; angle 100 deg
BEAM APERTURE 1.5 cm ; DC Bias kV
TUNED by, coarse MS fine
RF 15 to 30 mHz, stable $\pm 10^{-6}$
Orb F to mHz
HARMONICS, RF/Orb F, used
DEE - Gnd, max 60 kV, min gap 0.05 cm
STABILITY, (pk-pk noise)/(pk RF volt)
ENERGY GAIN, max 100 kV/turn
RF PHASE, stable to ± deg
RF POWER input, max 15 kW
FREQUENCY MODULATION, rate 500 /s
modulator, type pulsed
beam pulse, width 25-30 %

VACUUM SYSTEM

OPERATING PRESSURE 45 μ mbar
PUMPS, No, Type, Size Leybold E-250/two diffusion pumps

ION SOURCES

A "COLD-CATHODE" ion source is now being used.

INJECTION SYSTEM

EXTRACTION SYSTEM

Electrostatic

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 150 m² ; movable m²
TARGET STATIONS 3 in 2 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model PC Acer 500 ;
OTHER FACILITIES 19 in. ORTEC SCATT. CHAMBER

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	12	10	15	1.0
d	6	4.8	10	2.0
^{4}He	12	10	0.5	0.3
SECONDARY				(part/s)
0		20		10^5

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	30 %	2	pμ A of 5 MeV d ions
RESOL ΔE/E	1 %	2	pμ A of 5 MeV d ions

EMITTANCE
(π mm. mrad) { axial / rad } pμA of MeV ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 10% SOLID STATES PHYSICS
BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS
PIXE 70%
PROTON ACTIVATION ANALYSIS 20%

REFERENCES/NOTES

(1) Nucl. Inst. Meth. 18, 19, 120-124 and 125-128 (1962) UCD - CNL 56 Report (1970).
(2) Cyclotron transferred from UC Davis through U. Chile - U. Calif. cooperative program, financed by Ford Foundation.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS