ENTRY NO. 57

NAME OF MACHINE: NAC Light-ion Injector

INSTITUTION: National Accelerator Centre, Council for Scientific and Industrial Research.

ADDRESS: P O Box 72, Faure, 7131, Republic of South Africa

TEL: 024-43620 TELEX: 57-22202 SA

IN CHARGE: D Reitmann REPORTED BY: A H Botha

HISTORY AND STATUS

DESIGN, date: 1978 Model tests: 1979 - 1980

ENG DESIGN, date: 1978 - 1983

CONSTRUCTION, date: 1980 - 1983

FIRST BEAM, date (~~or goal~~): December 1983

MAJOR ALTERATIONS: -

COST, ACCELERATOR: R 1 500 000

COST, FACILITY, total: -

FUNDED BY: CSIR

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS: 4 ENGINEERS: 1

TECHNICIANS: 4 CRAFTS: 2

GRAD STUDENTS involved during year: 0

OPERATED BY: Research staff or Operators

OPERATION: hr/wk. On target: hr./wk

TIME DISTR. in house: % Outside: %

BUDGET, op & dev

FUNDED BY: CSIR

RESEARCH STAFF, not included above

USERS, in house: outside:

GRAD STUDENTS involved during year:

RESEARCH BUDGET, in house:

FUNDED BY: CSIR

MAGNET

POLE FACE, diameter (compact): 116 cm, R extraction 47,6 cm

R injection: - cm

GAP, min 15,6 cm, Field 12,3 kG
max~~min~~ 25,0 cm, Field 7,5 kG
at 2,15 x 10^{+5} Ampere turns

AVERAGE FIELD at R ext: 9,8 kG

B max/ < B >: 1,25

NUMBER OF SECTORS: compact 4; separated -; Spiral, max 0 deg

SECTOR ANGLE (SSC): - deg

TRIMMING COILS: Seven pairs of circular coils and two sets of harmonic coils.

CONDUCTOR, material and type: Copper, HC

STORED ENERGY (~~cryogenic~~): 0,1 MJ

POWER: main coils 90 max, kW; current stability 10^{-5}
trimming coils 2 max, kW; current stability 10^{-4}

WEIGHT: Fe 54,5 tons; coils 1,85 tons

COOLING system: Demineralised water.

ION ENERGY (bending limit) E/A = 8 q^2/a^2 MEV/amu
(focusing limit) E/A = 8 q/a MeV/amu

ACCELERATION SYSTEM

DEES, number: 2 90 deg

BEAM APERTURE: 4 cm; DC Bias: 0 kV

TUNED by, coarse: MS fine: VC, AUTO

RF: 8,6 to 26 mHz, stable ±

Orb F: 1,43 to 13 mHz

HARMONICS, RF/Orb F, used: 2 and 6

DEE—Gnd, max: 60 kV, min gap: 0,5 cm

STABILITY, (pk-pk noise)/(pk RF volt): 10^{-3}

ENERGY GAIN, max: 240 kV/turn

RF PHASE, stable to ±: 0,1 deg

RF POWEP input, max: 2 x 25 kW

FREQUENCY MODULATION, rate: - /s

modulator, type: -

beam pulse, width: -

VACUUM SYSTEM

OPERATING PRESSURE: 10^{-6} Torr or mbar

PUMPS, No, Type, Size: 1 Turbo 4,8 $m^3 s^{-1}$, 1 Roots 350 $m^3 h^{-1}$, 1 Rotary Vane 60 $m^3 h^{-1}$, 2 Cryo-pumps 5 $m^3 s^{-1}$

ION SOURCES

Internal Hot Cathode Source.

INJECTION SYSTEM -

EXTRACTION SYSTEM

One Electrostatic channel and two magnetic channels.

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed: m^2; movable: m^2

TARGET STATIONS: in

STATIONS served at same time, max:

MAG SPECTROGRAPH, type:

COMPUTER model:

OTHER FACILITIES:

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	0,8 - 8	4 - 8	200	-
d	0,4 - 4			
^{3}He	1 - 10,7			
^{4}He	0,8 - 8			
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)	axial	pμ A of MeV
	rad	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS: SOLID STATES PHYSICS:

BIOMEDICAL APPLICAT: ISOTOPE PRODUCTIONS:

REFERENCES/NOTES

1) Proc. Ninth Int. Cycl. Conf., 33, 129 (1981).

PLAN VIEW OF FACILITY, COMMENTS, ETC.