ENTRY No. 53

NAME OF MACHINE NAC Separated Sector Cyclotron DATE July 1981
INSTITUTION National Accelerator Centre
ADDRESS P O Box 72, Faure 7131, Republic of South Africa
TEL 43620 TELEX 57-22202 S.A.
IN CHARGE D Reitmann REPORTED BY A H Botha

HISTORY AND STATUS

DESIGN, date 1977 Model tests
ENG DESIGN, date 1978
CONSTRUCTION, date 1979
FIRST BEAM, date (or goal) Goal - Dec 1984
MAJOR ALTERATIONS -
COST, ACCELERATOR
COST, FACILITY, total
FUNDED BY CSIR

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 12 ENGINEERS 18
TECHNICIANS 33 CRAFTS 6
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

MAGNET

POLE FACE, diameter (compact) 909. cm, R extraction 443. cm
R injection cm
GAP, min 6.6 cm, Field 12.7 kG
max cm, Field kG } at
AVERAGE FIELD at R ext 5.2 kG } Ampere turns
B max/ <B> 2.4
NUMBER OF SECTORS { compact / separated 4 } Spiral, max 0. deg
SECTOR ANGLE (SSC) 34 deg
TRIMMING COILS 29
CONDUCTOR, material and type Copper HC
STORED ENERGY (cryogenic) 1 MJ
POWER : main coils 700. max, kW ; current stability 10^{-5}_{-4}.
trimming coils 150 max, kW ; current stability 10.
WEIGHT : Fe 1400 tons ; coils 5,8 tons
COOLING system Demineralized water
ION ENERGY (bending limit) E/A = 200. q^2/a^2 MeV/amu
(focusing limit) E/A = 200. q /a MeV/amu

ACCELERATION SYSTEM

DEES, number 2 ; angle 51 deg
BEAM APERTURE 3 cm ; DC Bias 0 kV
TUNED by, coarse MS,VC fine VC
RF 6 to 26 mHz, stable ±
Orb F 0.5 to 6,5 mHz
HARMONICS, RF/Orb F, used 4. and 12
DEE - Gnd, max 250 kV, min gap 10 cm
STABILITY, (pk-pk noise)/(pk RF volt)
ENERGY GAIN, max 1000 kV/turn
RF PHASE, stable to ± deg
RF POWER input, max 2 x 150 kW kW
FREQUENCY MODULATION, rate - /s
modulator, type -
beam pulse, width -

VACUUM SYSTEM

OPERATING PRESSURE 0.5 x 10^{-6} Torr ~~or mbar~~
PUMPS, No, Type, Size 4 Rotary vane 120 m^3h^{-1}. 4 roots pumps 350 m^3h^{-1}, 4 turbo 2 m^3s^{-1}, 2 turbo 6.5 m^3s^{-1} and 6 cryopumps 25 m^3s^{-1}.

ION SOURCES

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INJECTION SYSTEM

Two dipoles and a magnetic channel in one pole-tip

EXTRACTION SYSTEM

Electrostatic channel and two septum-magnets

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 700 m² ; movable 900 m²
TARGET STATIONS 8 in 7 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type -
COMPUTER model
OTHER FACILITIES
1. Facility for Isotope Production
2. Facility for Radiotherapy

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
$^1H^{1+}$	100 - 200		10	10
$^1H^{1+}$	40 - 100		100	100
$^4He^{2+}$	40 - 200		10	10
$^{40}A^{13+}$	660			
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 / rad }		pμA of	MeV	ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS ..
BIOMEDICAL APPLICAT. ....
SOLID STATES PHYSICS ....
ISOTOPE PRODUCTIONS ....

REFERENCES/NOTES

1. W L Rautenbach and A H Botha, Seventh Int. Conf. on Cyclotrons and Their applications Zürich (1975) pp. 117.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

2. A H Botha, Eighth Int. Conf. on Cyclotrons and Their Applications Bloomington (1978) pp. 1896.