ENTRY NO. 58

NAME OF MACHINE: NAC Separated-Sector Cyclotron

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 1977 Model tests
ENG DESIGN, date 1978
CONSTRUCTION, date 1979
FIRST BEAM, ~~date~~ (or goal) July 1985
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
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) - cm, R extraction 443 cm
R injection 101 cm
GAP, min 6,6 cm, Field 12,7 kG
min cm, Field kG } at 1,08 x 10^5
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)~~ 1,5 MJ
POWER: main coils 700 max, kW; current stability 10^{-5}
trimming coils 150 max, kW; current stability 10^{-4}
WEIGHT: Fe 1400 tons; coils 5,8 tons
COOLING system Demineralised 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, 51 deg
BEAM APERTURE 3 cm; DC Bias 0 kV
TUNED by, coarse MS, VC fine VC, AUTO
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 POWEP input, max 2 x 150 kW
FREQUENCY MODULATION, rate - /s
modulator, type -
beam pulse, width -

VACUUM SYSTEM

OPERATING PRESSURE $0,5 \times 10^{-6}$ Torr ~~or mbar~~
PUMPS, No, Type, Size 4 Rotary vane 120 m^3h^{-1}
4 roots pumps 350 m^3h^{-1}, 4 turbo pumps 2m^3s^{-1}
2 turbo pumps 6,5 m^3s^{-1} and 6 cryo-pumps 25 m^3s^{-1}

ION SOURCES

—

INJECTION SYSTEM

Two dipoles and a magnetic channel in one pole-tip.

EXTRACTION SYSTEM

One electrostatic channel and two septum-magnets.

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 700 m²; movable 900 m²
TARGET STATIONS 9 in 9 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type -
COMPUTER model
OTHER FACILITIES
1. Facility of Isotope Production.
2. Facility fo Radiotherapy.

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	40 - 200			
d	40 - 100			
^{3}He	40 - 300			
^{4}He	40 - 200			
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 (1981).

PLAN VIEW OF FACILITY, COMMENTS, ETC.

An isocentric system for neutrontherapy is on order.