ENTRY NO. 48

NAME OF MACHINE NAC Separated-sector Cyclotron DATE 24 July 1978
INSTITUTION National Accelerator Centre
ADDRESS P O Box 320, Stellenbosch, 7600, South Africa.

IN CHARGE G Heymann REPORTED by A H Botha

HISTORY AND STATUS

DESIGN, date 1975 MODEL tests 1975
ENG. DESIGN, date 1978
CONSTRUCTION, date 1979
FIRST BEAM date (or goal) Dec. 1983
MAJOR ALTERATIONS

OPERATION, hr/wk; On Target hr/wk
TIME DIST., in house %, outside %
USERS' SCHEDULING CYCLE weeks
COST, ACCELERATOR
COST, FACILITY, total
FUNDED BY

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 7 ENGINEERS 10
TECHNICIANS 18 CRAFTS
GRAD STUDENTS involved during year
OPERATED BY Res staff or Operators
BUDGET, op & dev
FUNDED BY

RESEARCH STAFF, not included above

USERS, in house outside
GRAD STUDENTS involved during year
RES. BUDGET, in house
FUNDED BY

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 700 m^2
movable 900 m^2
TARGET STATIONS ~25 in 10 rooms
STATIONS served at same time, max One
MAG SPECTROGRAPH, type
COMPUTER, model
OTHER FACILITIES

MAGNET

POLE FACE diameter 909 cm; R extraction 443 cm
GAP, min 6 cm; Field 12,7 kG
max - cm; Field - kG
AVERAGE FIELD at R ext 5,2 kG
} at 0,105 x 10^6 ampere turns
CURRENT STABILITY 10 parts/10^6; $B_{max}/\langle B \rangle$ 2,4
NUMBER OF SECTORS 4 ; SPIRAL, max 0 deg
POLE FACE COIL PAIRS: AVF - /sec;
Harmonic correction -
Rad grad ~27 /sec or Circ coils -
WEIGHT: Fe 1400 tons; Coils ~5,8 tons
CONDUCTOR, Material and type Copper HC
STORED ENERGY 1 MJ
COOLING SYSTEM demineralized water
POWER: Main coils 700 max, kW
Trimming coils 150 max, kW
YOKE/POLE AREA 74 %
SECTOR ANGLE (Sep Sec) 34 deg
ION ENERGY (Bending limit) E/A = 200 q^2/A^2 MeV
(Focusing limit) E/A = 200 q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 51° deg
BEAM APERTURE 3 cm; DC BIAS 0 kV
TUNED by, coarse MS, VC fine VC
RF 5 to 26 mHz, stable ± 1 part /10^6
Orb F 0,5 to 6,5 mHz; GAIN, max 1000 kV/turn
HARMONICS, RF/Orb F, used 4,12
DEE-Gnd, max 250 kV, min gap 10 cm
STABILITY, (pk-pk noise)/(pk RF volt)
RF PHASE stable to ± deg
RF POWER input, max 2 × 150 kW
RF PROTECT circuit, speed μsec
Type
FREQUENCY MODULATION, rate 0 /sec
MODULATOR, type -
BEAM PULSE, width -

VACUUM SYSTEM

PUMPS, No., Type, Size 4 Rotary vane (200 m^3/hr), 4 Turbo molecular (4000 1/s), 8 cryopumps.
OPERATING PRESSURE 0,1 μTorr,
PUMPDOWN TIME 20 hrs

ION SOURCES/INJECTION SYSTEM

Two bending magnets in central region and a magnetic inflection channel in one pole-tip

EXTRACTION SYSTEM Electrostatic channel and two septum magnets.

CONTROL SYSTEM

Multi-minicomputer system with CAMAC interfacing. The system has a hierarchial structure: 2 senior-level and 3 junior-level computers.

REFERENCES/NOTES

1. W L Rautenbach, A H Botha, Seventh Int. Conf. on Cyclotrons and their Applications, Zürich(1975)pp.117-122
2. A H Botha et al., IEEE Trans.Nucl. Sci. NS-24,No.3(1977),pp 1118 - 1120.
3. National Accelerator Project, Technical Report of the Accelerator Task Group., (1976)

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CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	$^{1}H^{1+}$	20-200	
	$^{20}Ne^{8+}$	358	
	$^{40}Ar^{13+}$	660	
CURRENT		(μA)	(μA)
Internal			
External	$^{1}H^{1+}$(200MeV)	10	
	$^{1}H^{1+}$(80MeV)	100	
	Heavy ions	1 pμA	
		(part/s)	(part/s)
Secondary	–	–	–
	–	–	–

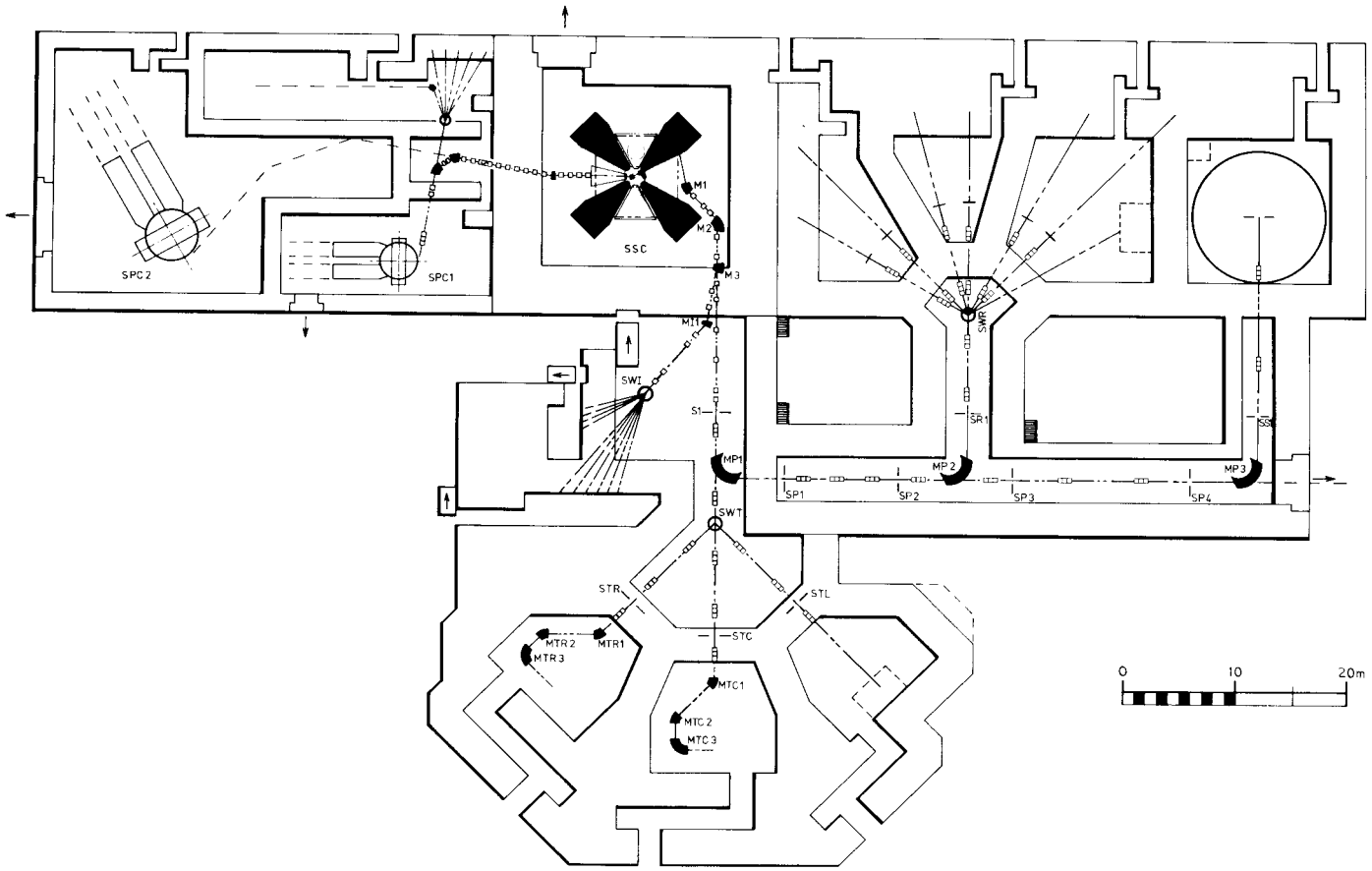
BEAM PROPERTIES

	Measured	Conditions
Pulse Width	____ RF deg	____ μA of ____ MeV ____
Phase Exc, max	____ RF deg	____ μA of ____ MeV ____
Extract Eff	____ %	____ μA of ____ MeV ____
Res, ΔE/E	____ %	____ μA of ____ MeV ____
Emittance		
(mm-mrad) { ____ axial, ____ radial }		____ μA of ____ MeV ____

OPERATING PROGRAMS, time dist

Basic Nuclear Physics ____ %
Solid State Physics ____ %
Bio-Medical Applications ____ %
Isotope Production ____ %
Development ____ %
____ %
____ %

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES



Layout of Facility