ENTRY NO. 50

NAME OF MACHINE ..... Delft Isochronus Cyclotron .... DATE .... 3 July, 1981
INSTITUTION ..... Delft University of Technology, Department of Electrical Engineering
ADDRESS ..... P.O. Box 5031, 2600 GA Delft, The Netherlands
TEL .... (015) 786214 ..... TELEX ..... 38070 bithd nl
IN CHARGE .... W.A. van Kampen ..... REPORTED BY ..... J. Liedorp

HISTORY AND STATUS

DESIGN, date ..... 1955 ..... Model tests ..... none .....
ENG DESIGN, date ..... 1955/1957 ..... 1966/1968 .....
CONSTRUCTION, date ..... 1955/1957 ..... 1967/1969 .....
FIRST BEAM, date (or goal) ..... 1957 ..... 1969 .....
MAJOR ALTERATIONS ..... 1966 ..... 1974 .....
.....
COST, ACCELERATOR .....
COST, FACILITY, total .....
FUNDED BY ..... Government .....

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ..... 2 ..... ENGINEERS .....
TECHNICIANS ..... 1 ..... CRAFTS .....
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 .....

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) .. 85 ... cm, R extraction .. 38 .. cm
R injection ..... cm
GAP, min ... 9 ... cm, Field ..... 16 ... kG
min .. 15 ... cm, Field ..... 10 ... kG } at 156x10^6 Ampere turns
AVERAGE FIELD at R ext ..... 13.5 kG
B max/ < B > 1.12
NUMBER OF SECTORS { compact 4 ..... separated ..... } Spiral, max .37 deg
SECTOR ANGLE (SSC) ..... deg
TRIMMING COILS .....
.....
CONDUCTOR, material and type .... Al .....
STORED ENERGY (cryogenic) ..... MJ
POWER: main coils ... 24 ... max, kW; current stability .. 10^-4
trimming coils .... 1 ... max, kW; current stability .....
WEIGHT: Fe ..... 26 .. tons; coils ..... 1.65 ..... tons
COOLING system ..... water .....
ION ENERGY (bending limit) E/A = ... q^2/a^2 MEV/amu
(focusing limit) E/A = ... q/a MeV/amu

ACCELERATION SYSTEM

DEES, number ..... 1 ..... ; ... angle ..... 180 ..... deg
BEAM APERTURE .... 2 ..... cm; DC Bias ... 0 - .3 ..... kV
TUNED by, coarse .... short ..... fine moving panel .....
RF ..... 20.2 ... to ..... 20.9 .... mHz, stable ± .. 10^{-5} .....
Orb F .. 20.6 ..... to ..... mHz
HARMONICS, RF/Orb F, used .....
DEE—Gnd, max ..... 30 ..... kV, min gap ..... cm
STABILITY, (pk-pk noise)/(pk RF volt) .....
ENERGY GAIN, max ..... kV/turn
RF PHASE, stable to ± ..... deg
RF POWER input, max ..... 50 ..... kW
FREQUENCY MODULATION, rate ..... /s
modulator, type .....
beam pulse, width .....

VACUUM SYSTEM

OPERATING PRESSURE .. 2 x 10^{-6} ..... Torr or mbar
PUMPS, No, Type, Size .... oil diffusion pump .....
.....
.....

ION SOURCES

..... duoplasmatron .....

INJECTION SYSTEM

.... Precession Injection .....

EXTRACTION SYSTEM

.....

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
n	12.7	12.7	100	
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 .....
.....
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REFERENCES/NOTES

W.A. van Kampen and J. Liedorp, Experimentia Suppl. (Zurich) 24(1975) 254.
W.A. van Kampen and J. Liedorp, Nucl. Instr. and Meth. 140(1977) 219.

PLAN VIEW OF FACILITY, COMMENTS, ETC.

1966: the magnetic field and the r.f. system redesigned to incorporate spiral ridge magnet poles and externally excited r.f. system.
1974: cyclotron magnet central region and dee at the central region modified for precession injection.
1975 July: 110μA protons accelerated up to 12MeV with external ion source and precession injection.
1976/1978: beam line between pre-accelerator and cyclotron equipped with slits and a chopping system.
1979: operation ended.
1981: plans exist to use machine as antiproton decelerator at CERN.

notes:
1 from the original cyclotron, which was the first AVF proton cyclotron to operate, the magnet yoke, magnet excitation and windings and the vacuum chamber are still the same.
2 data given refer to the cyclotron with precession injection.