ENTRY NO. 4

NAME OF MACHINE CYCLONE

INSTITUTION Université Catholique de Louvain

ADDRESS Chermin du Cyclotron, 2-B-1348 LOUVAIN-LA-NEUVE, Belgium

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IN CHARGE Y. JONGEN REPORTED BY G. RYCKEWAERT

HISTORY AND STATUS

DESIGN, date 1969 Model tests 1969

ENG DESIGN, date 1968-1969

CONSTRUCTION, date 1969-1971

FIRST BEAM, date (or goal) 1972

MAJOR ALTERATIONS

COST, ACCELERATOR 3. 10^6 $ U.S.

COST, FACILITY, total 6.5 10^6 $ U.S.

FUNDED BY University of Louvain, IISN (State)

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS - ENGINEERS 3

TECHNICIANS 9 CRAFTS 3

GRAD STUDENTS involved during year -

OPERATED BY Research staff or 4 Operators

OPERATION 168 hr/wk On target 140 hr/wk

TIME DISTR. in house %, outside %

BUDGET, op & dev 600,000 $ includ. salaries

FUNDED BY IISN - UCL

RESEARCH STAFF, not included above

USERS, in house 30 outside 45

GRAD STUDENTS involved during year 10

RESEARCH BUDGET, in house 450,000 $ without salaries

FUNDED BY IISN - UCL

MAGNET

POLE FACE, diameter (compact) 215.6 cm, R-extraction 93 cm

R injection - cm

GAP, min 16.6 cm, Field 21.5 kG

max 40.5 cm, Field 11.5 kG at 4 10^6

AVERAGE FIELD at R ext 16 kG Ampere turns

B max/<B>

NUMBER OF SECTORS compact 4 separated Spiral, max 53 deg

SECTOR ANGLE (SSC) deg

TRIMMING COILS 12 pairs

CONDUCTOR, material and type Cu (20 × 20 ϕ 13mm)

STORED ENERGY (cryogenic) MJ

POWER: main coils 400 max kW: current stability 10^{-5}

trimming coils 100 max kW: current stability 10^{-3}

WEIGHT: Fe 200 tons: coils 6 tons

COOLING system deionized water

ION ENERGY (Bending limit) F/A = 130 q^2/A^2 MeV/amu

(Focusing limit) F/A = 95 q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 2 angle 86 deg

BEAM APERTURE 3.8 cm, DC Bias 0 kV

TUNED by, coarse MP fine MP. auto

RF 10.6 to 23 MHz, stable ± 0.1 10^{-6}

Orb F 3.6 to 23 MHz

HARMONICS, RF/Orb F, used 1, 2, 3

DEE–Gnd, max 50 kV, min gap cm

STABILITY, (pk-pk noise)/(pk RF volt) 10^{-4}

ENERGY GAIN, max 200 kV/turn

RF PHASE, stable to ± 0.1 deg

RF POWER input, max. 200 kW

FREQUENCY MODULATION, rate -/s

modulator, type -

beam pulse, width -

VACUUM SYSTEM

OPERATING PRESSURE 2 10^{-6} Torr or mbar

PUMPS, No, Type, Size 2 × (OIL. DIF. 12,000 l/s)

ION SOURCES

Internal: Livingston-Jones, Hot cathode Pig

External: ECR

INJECTION SYSTEM

Axial injection

EXTRACTION SYSTEM

DC electrostatic+weak magn. channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 390 m^2, movable 1300 m^2

TARGET STATIONS 14 in 10 rooms rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type -

COMPUTER model -

OTHER FACILITIES Remote target handling-hot cell neutron beam (radiotherapy-biology) - neutron beam physics) - on line mass separator (LISOL)

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	80	95	2000	50
α	80	130	200	45
Heavy ions		130 Q^2/A		
Ar^{8+}				0.1
SECONDARY			(part/s)	
n from (d+Be 50 MeV)			10^{14}	

BEAM PROPERTIES

MEASURED		CONDITIONS			
PULSE WIDTH	10 - 30 RF deg	20	pμA of 33	MeV	D ions
PHASE EXC. max	30 RF deg	5	pμA of 65	MeV	P ions
EXTRACT eff.	90 %	20	pμA of 65	MeV	P ions
RESOL ΔE/E	0.3 %	1	pμA of 40	MeV	α ions
EMITTANCE					
(π mm-mrad)	40 axial	1	pμA of 65	MeV	P
	60 rad				

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 50 SOLID STATES PHYSICS -

BIOMEDICAL APPLICAT. 15 ISOTOPE PRODUCTIONS 25

REFERENCES/NOTES

1)

2)

PLAN VIEW