

ENTRY No. 1
 NAME OF MACHINE IRE CYCLOTRON DATE
 INSTITUTION INSTITUT. NATIONAL DES RADIOELEMENTS
 ADDRESS R-6220 FLEURUS BELGIUM
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 IN CHARGE C. PIRART REPORTED BY C. PIRART

HISTORY AND STATUS

DESIGN, date 1980 Model tests
 ENG DESIGN, date
 CONSTRUCTION, date 1981-1983
 FIRST BEAM, date (or goal) 1983
 MAJOR ALTERATIONS INTERNAL TARGET 1986

COST, ACCELERATOR 6×10^{-6} US \$
 COST, FACILITY, total 12×10^{-6} US \$
 FUNDED BY Belgian state

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
 SCIENTISTS 1 ENGINEERS 2
 TECHNICIANS 6 CRAFTS 2

GRAD STUDENTS involved during year
 OPERATED BY Research staff or 6 Operators
 OPERATION hr/wk, On target hr/wk
 TIME DISTR. in house 100% % 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) 215.6cm, R extraction 92.4 cm
 R injection cm
 GAP, min 1.6, 6 cm, Field 2.1, 5 kG }
 max 4.0, 5 cm, Field 1.1, 5 kG } at 4×10^6
 AVERAGE FIELD at R ext 1.6 kG } Ampere turns
 B max/

NUMBER OF SECTORS { compact 4 } Spiral, max 53 deg
 separated
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS 12 pairs

CONDUCTOR, material and type Cu, 20 X 20 0.13
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 400 max, kW; current stability 10^{-5}
 trimming coils 60 max, kW; current stability 10^{-3}

WEIGHT: Fe 200 tons; coils 6 tons
 COOLING system deionized water
 ION ENERGY (bending limit) E/A = $110 \text{ q}^2/\text{a}^2 \text{ MeV/amu}$
 (focusing limit) E/A = $80 \text{ q}^2/\text{a}^2 \text{ MeV/amu}$

ACCELERATION SYSTEM

DEES, number 2; angle 86 deg
 BEAM APERTURE 3.8 cm; DC Bias kV
 TUNED by, coarse Mov. Panel fine Move. Panel Auto
 RF 1.0-6 to 23 mHz, stable $\pm 10^{-7}$
 Orb F 5.3 to 23 mHz
 HARMONICS, RF/Orb F, used 1, 2
 DEE - Gnd, max 50 kV, min gap cm
 STABILITY, (pk-pk noise)/(pk RF volt) $< 10^{-3}$
 ENERGY GAIN, max 200 kV/turn
 RF PHASE, stable to ± 0.1 deg
 RF POWER input, max 2 X 70 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 X QIL DIF. PUMPS 12000 l/s

ION SOURCES

Internal Livingston-Jones

INJECTION SYSTEM

EXTRACTION SYSTEM

DC electrostatic + active magnetic channel
FACILITIES FOR RESEARCH
 SHIELDED AREA, fixed m²; movable m²
 TARGET STATIONS 6 in 3 rooms
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type
 COMPUTER model VAX 7.50-UVAX+ROSEMOUNT control
 OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pA)	
	Goal	Achieved	Internal	External
p	80	80	500	50
α	110	110	200	50
d	55	55		60

SECONDARY

(part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH RF deg μA of MeV ions
 PHASE EXC, max RF deg μA of MeV ions
 EXTRACT eff 90% 40 μA of 65 MeV p. ions
 RESOL ΔE/E % μA of MeV ions
 EMITTANCE
 (π mm. mrad) { axial } μA of MeV ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS

REFERENCES/NOTES

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

