

ENTRY NO. 22

NAME OF MACHINE **ORLEANS ISOCHRONOUS CYCLOTRON**
 INSTITUTION **CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE**
 ADDRESS **Centre d'Etudes et de Recherches par Irradiation 3A, Rue de la Férollerie 45071. ORLEANS Cedex 2 (France)**
 TEL **38.63.19.09** TELEX **CNSORL 760351 F**
 IN CHARGE **Gérard GOIN** REPORTED BY **Gérard GOIN**

HISTORY AND STATUS

DESIGN, date . . . 1971 Model tests . . . 1971
 ENG DESIGN, date . . . 1971
 CONSTRUCTION, date . . . 1972-1973. CGR-MeV 680 type
 FIRST BEAM, date (or goal) . . . 1974
 MAJOR ALTERATIONS

COST, ACCELERATOR 9×10^6 FF (1970)
 COST, FACILITY, total 8.5×10^6 FF (1974) + 8×10^6 FF (1980)
 FUNDED BY . . . C.N.R.S.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS 3
 TECHNICIANS 4 CRAFTS
 GRAD STUDENTS involved during year
 OPERATED BY . . . Research staff or . . . 6 . . . Operators
 OPERATION 61 hr/wk. On target 35 hr/wk
 TIME DISTR. in house . . . 83 % . . . outside . . . 17 %
 BUDGET, op & dev 2.23×10^6 FF (1983)
 FUNDED BY . . . C.N.R.S.

RESEARCH STAFF, not included above

USERS, in house . . . 5 groups outside 7 groups
 GRAD STUDENTS involved during year . . . 4
 RESEARCH BUDGET, in house
 FUNDED BY . . . C.N.R.S.

MAGNET

POLE FACE, diameter (compact) . . . 160 cm, R-extraction 67.5 cm
 R injection . . . 13 cm
 GAP, min . . . 27 cm, Field . . . 19 kG }
 max . . . cm, Field . . . 11 kG } at $0.25 \cdot 10^6$
 AVERAGE FIELD at R ext . . . 15 kG } Ampere turns
 B max / < B > . . . 1.27

NUMBER OF SECTORS { compact . . . 4 . . . } Spiral, max . 53 deg
 { separated }

SECTOR ANGLE (SSC) deg
 TRIMMING COILS Harmonic coils 4
 Circ. coils . . . 8

CONDUCTOR, material and type
 STORED ENERGY (cryogenic) MJ
 POWER: main coils . . 110 max kW; current stability $2 \cdot 10^{-5}$
 trimming coils . . . 28 max kW; current stability $2 \cdot 10^{-5}$

WEIGHT: Fe 100 tons; coils tons
 COOLING system . . . Demineralised water
 ION ENERGY (Bending limit) E/A = . . 50 q²/A² MeV/amu
 (Focusing limit) E/A = . . 50 q/A MeV/amu

ACCELERATION SYSTEM

DEES, number . . . 2 angle 60. deg
 BEAM APERTURE . . . 3 cm; DC Bias kV
 TUNED by, coarse M-PANEL fine M-PANEL
 RF . . . 20 to . . . 40 MHz, stable $\pm 1 \cdot 10^{-6}$
 Orb F 5 to . . . 20 MHz
 HARMONICS, RF/Orb F, used
 DEE-Gnd, max . . . 40 kV, min gap cm
 STABILITY, (pk-pk noise)/(pk RF volt) . . . $5 \cdot 10^3$
 ENERGY GAIN, max . . . 132 kV/turn
 RF PHASE, stable to ± 0.2 deg
 RF POWER input, max . . . 110 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE . . . 2×10^{-6} Torr or mbar
 PUMPS, No, Type, Size . . . Diffusion pumps
 2×6000 l/s

ION SOURCES

Internal Livingstone. Type

INJECTION SYSTEM

EXTRACTION SYSTEM

ELECTROSTATIC DEFLECTOR. + FOCUSING. MAGNET FACILITIES FOR RESEARCH

SHIELDED AREA, fixed . . . 25 . . . m²; movable . . . 225 . . . m²
 TARGET STATIONS 4 in 4 shielded . . . rooms
 STATIONS served at same time, max . . . 1
 MAG SPECTROGRAPH, type
 COMPUTER model

OTHER FACILITIES **FAST. NEUTRON PRODUCTION FOR neutrontherapy, biology and activation - short lived gas. isotope production - Isotope production (¹²³I)**

CHARACTERISTIC BEAMS Chemistry facility with hot cells

PARTICLE	ENERGY (MeV)		CURRENT (µA)	
	Goal	Achieved	Internal	External
Proton . . .	5-38 . . .	5-36 . . .	200 . . .	55 . µA . . .
Deuteron . . .	5-24 . . .	5-25 . . .	" . . .	" . . .
Alpha . . .	10-48 . . .	10-50 . . .	100 . . .	10 . µA . . .
³ He . . .	10-60 . . .	10-60 . . .	" . . .	" . . .

SECONDARY (part/s)
n_p from P+Be for 10 x 10 cm Field SIZE at 135 cm SSD.
.34 MeV - 40 µA - Dose rate at D_{max} 20 CGy . min⁻¹

BEAM PROPERTIES

MEASURED	CONDITIONS		Depth of $\frac{D_{max}}{2} = 12$ cm
	MEASURED	CONDITIONS	
PULSE WIDTH 25-30 RF deg5 . . . µA of . . . 25 . MeV . . . d . . . ions		
PHASE EXC, max . . . RF deg µA of . . . MeV ions		
EXTRACT eff. . . 65 %40 . . . µA of . . . 34 . MeV . . . p . . . ions		
RESOL ΔE/E % µA of MeV ions		
EMITTANCE			

(π mm-mrad) axial
 40 . rad 3 . . . µA of . . . 45 . MeV . . . α . . .

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS .0% SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. 38 % ISOTOPE PRODUCTIONS . . 2,5 %
 MATERIALS CHARACTERIZATION 59,5 %

REFERENCES/NOTES

- 1)
- 2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.

