ENTRY NO. 19

NAME OF MACHINE ORLEANS ISOCHRONOUS CYCLOTRON

INSTITUTION CENTRE NATIONAL de la RECHERCHE SCIENTIFIQUE

ADDRESS SERVICE DU CYCLOTRON - 3A, Rue de la FEROLLERIE 45045 ORLEANS CEDEX (FRANCE)

TEL (38) 63.19.09 TELEX

IN CHARGE Gérard COIN REPORTED BY G. COIN

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 8.5×10^6FF(1974)+8×10^6 FF(1980)

FUNDED BY C N R S

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS 2

TECHNICIANS 5 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 x 10^6 FF (1983)

FUNDED BY CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

RESEARCH STAFF, not included above

USERS, in house 5 groups outside 9 groups

GRAD STUDENTS involved during year 2

RESEARCH BUDGET, in house

FUNDED BY C.N.R.S.

MAGNET

POLE FACE, diameter (compact) 160 cm, R extraction 67.5 cm

R injection cm

GAP, min 13 cm, Field 19 kG
min 27 cm, Field 11 kG
at 0.25 10^6 Ampere turns

AVERAGE FIELD at R ext 15 kG

B max/ < B > 1.27

NUMBER OF SECTORS compact 4
separated
Spiral, max 53 deg

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 10^{-5}
trimming coils 28 max, kW; current stability 2. 10^{-5}

WEIGHT: Fe 100 tons; coils tons

COOLING system DEMINERALISED WATER

ION ENERGY (bending limit) E/A = 50 q^2/a^2 MEV/amu
(focusing limit) E/A = 50 q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2 60 deg

BEAM APERTURE 3 cm; DC Bias kV

TUNED by, coarse M-PANEL fine M-PANEL

RF 20 to 40 mHz, stable ± 1 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. 10^{-3}

ENERGY GAIN, max 132 kV/turn

RF PHASE, stable to ± 0.2 deg

RF POWEP input, max 110 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 DIFFUSION PUMPS
2 x 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 NEUTRON-THERAPY, BIOLOGY and ACTIVATION - SHORT LIVED GAS ISOTOPE PRODUCTION - ISOTOPE PRODUCTION (123I)

CHARACTERISTIC BEAMS CHEMISTRY FACILITY WITH HOT CELLS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
PROTON	5-38	5-36	200	30 to 100
DEUTON	5-24	5-25	"	"
ALPHA	10-48	10-50	100	10 to 40
^{3}He	10-60	10-60	"	"

SECONDARY (part/s)

n, FROM P+Be FOR 10 x 10 cm FIELD SIZE AT 135 cm SSD 34MeV - 40μA - DOSE RATE AT D_{max} 20 CGy min^{-1}

Depth of $\frac{D_{max}}{2}$ = 12 cm

BEAM PROPERTIES

MEASURED		CONDITIONS
PULSE WIDTH 25-30 RF deg	5	pμ A of 25 MeV d ions
PHASE EXC. max RF deg		pμ A of MeV ions
EXTRACT eff 65 %	40	pμ A of 34 MeV p ions
RESOL ΔE/E %		pμ A of MeV ions
EMITTANCE (π mm. mrad) axial	3	pμ A of 45 MeV α
40 rad		

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 0 % SOLID STATES PHYSICS 41,5 %

BIOMEDICAL APPLICAT. 52 % ISOTOPE PRODUCTIONS 6,5 %

REFERENCES/NOTES

1)

2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.