

ENTRY No. C18

NAME OF MACHINE

ORLEANS ISOCHRONOUS CYCLOTRON DATE SEPTEMBER 1995

INSTITUTION

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

ADDRESS

C.E.R.N. - 3A. RUE DE LA FEROLLERIE 45071 ORLEANS CEDEX 2 (FRANCE)

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IN CHARGE G. GONIN

REPORTED BY G. GONIN

HISTORY AND STATUS

DESIGN, date 1971 Model tests 1971

ENG DESIGN, date 1971

CONSTRUCTION, date 1972-1973

FIRST BEAM, date (or goal) 1974

MAJOR ALTERATIONS

COST, ACCELERATOR 9.8.10⁶ FF (1970)COST, FACILITY, total 8.5x10⁶ FF (1974) + 8x10⁶ FF (1984)

FUNDED BY C.N.R.S.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS 3

TECHNICIANS 3 CRAFTS

GRAD STUDENTS involved during year

OPERATED BY Research staff or Operators

OPERATION 64 hr/wk. On target 46 hr/wk

TIME DISTR. in house 90 % Outside 10 %

BUDGET, op & dev 1.5 10⁶ FF (1995)

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RESEARCH STAFF, not included above

USERS, in house 12 outside 6

GRAD STUDENTS involved during year 2

RESEARCH BUDGET, in house

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MAGNET

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

R injection cm

GAP, min 1.3 cm, Field 19 kG

max 2.7 cm, Field 11 kG at 0.25.10⁶

AVERAGE FIELD at R ext 15 kG Ampere turns

B max/ 1.27

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

SECTOR ANGLE (SSC) deg

TRIMMING COILS HARMONIC COILS 4

CIRC. COILS 8

CONDUCTOR, material and type

STORED ENERGY (cryogenic) MJ⁵POWER: main coils 110 max, kW; current stability 2.10⁻⁵trimming coils max, kW; current stability 2.10⁻⁵

WEIGHT: Fe 1.00 tons; coils tons

COOLING system DEMINERALISED WATER

ION ENERGY (bending limit) E/A = .50 q²/a² MeV/amu(focusing limit) E/A = .50 q²/a² 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 ± 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 POWER input, max 110 kW

FREQUENCY MODULATION, rate /s

modulator, type

beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 2 x 10⁶ Torr or mbar

PUMPS, No, Type, Size DIFFUSION PUMPS

2 x 4000 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 rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type

COMPUTER model

OTHER FACILITIES-FAST NEUTRON PRODUCTION FOR NEUTRON ME-

RAPHY, BIOLOGY and ACTIVATION - SHORT LIVED GAZ ISOTOPE

PRODUCTION- ISOTOPE PRODUCTION - CHEMISTRY FACILITY

CHARACTERISTIC BEAMS WITH HOT CELLS

PARTICLE ENERGY (MeV) CURRENT (pA)

Goal Achieved Internal External

P .5-38 .5-36 55

d .5-24 .5-25 55

ALPHA .10-48 .10-50 10

SECONDARY (part/s)

n, FROM P+Be FOR 10x10cm FIELD SIZE AT 1.35 cm SSD

34 MeV DOSE RATE: 17 CGY/min

BEAM PROPERTIES

MEASURED CONDITIONS

PULSE WIDTH 25-30 RF deg 5 pA of 25 MeV 4 ions

PHASE EXC, max RF deg pA of MeV ions

EXTRACT eff .65 % 40 pA of 34 MeV p ions

RESOL ΔE/E % pA of MeV ions

EMITTANCE

(π mm. mrad) {axial} 3 pA of 45 MeV p ions

{40 rad}

OPERATING PROGRAMS, time distribution

SOLID STATES PHYSICS 70 %

NEUTRON THERAPY BIOMEDICAL APPLICATION 30 %

REFERENCES/NOTES

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

