

ENTRY NO. EM-4

NAME OF MACHINE SYNCHROCYCLOTRON 200 MeV protons (S.C., 200) Avril 1984
 INSTITUTION Institut de Physique Nucléaire
 ADDRESS 91406 ORSAY - B.P. n° 1 - CEDEX FRANCE
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 IN CHARGE Mme. GERLIC REPORTED BY Mr. M. LOUIS

HISTORY AND STATUS

DESIGN, date 1972 Model tests
 ENG DESIGN, date 1973
 CONSTRUCTION, date sept. 1975
 FIRST BEAM, date (or goal) 20.6.1977
 MAJOR ALTERATIONS

COST, ACCELERATOR about 10 MF
 COST, FACILITY, total 20 MF
 FUNDED BY Institut de Physique Nucléaire et
 de Physique des Particules IN2P3

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
 SCIENTISTS 1 ENGINEERS 1
 TECHNICIANS 27 CRAFTS 3

GRAD STUDENTS involved during year
 OPERATED BY Research staff or 8 Operators
 OPERATION 104 hr/wk. On target 200 hr/wk
 TIME DISTR. in house 90% Outside 10%
 BUDGET, op & dev 500 KF
 FUNDED BY IN2P3

RESEARCH STAFF, not included above
 USERS, in house 50 outside 20
 GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house
 FUNDED BY C.N.R.S. - IN2P3

MAGNET
 POLE FACE, diameter (compact) 320 cm, R extraction 140 cm
 R injection 1 cm
 GAP, min 40 cm, Field 16,07 to 14,8 kG
 min 15,4 to 14,1 kG at 6,3 Å . 5 x 10⁶
 AVERAGE FIELD at R ext 15,4 to 14,1 kG Ampere turns
 B max/ < B >

NUMBER OF SECTORS { compact } Spiral, max deg
 { separated }
 SECTOR ANGLE (SSC) no deg
 TRIMMING COILS yes

CONDUCTOR, material and type copper
 STORED ENERGY (cryogenic) MJ 5
 POWER: main coils 350 max, kW; current stability ±3.10⁻⁵
 trimming coils 40 max, kW; current stability ±3.10⁻⁵
 WEIGHT: Fe 900 tons; coils 22 tons
 COOLING system De-ionized water
 ION ENERGY (bending limit) E/A = 223 q²/a² MEV/amu
 (focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 1 180deg
 BEAM APERTURE 6 cm; DC Bias 1 kV
 TUNED by, coarse fine
 RF 25 to 10 MHz, stable ±
 Orb F 25 to 10 MHz
 HARMONICS, RF/Orb F, used
 DEE-Gnd, max 20 kV, min gap 0,4 cm
 STABILITY, (pk-pk noise)/(pk RF volt)
 ENERGY GAIN, max 20 kV/turn
 RF PHASE, stable to ± deg
 RF POWER input, max 30 kW
 FREQUENCY MODULATION, rate 440 anc. 700 new. /s
 modulator, type rotating condenser
 beam pulse, width 50-100 micro.seconde

VACUUM SYSTEM

OPERATING PRESSURE 2-10⁻⁶ Torr or mbar
 PUMPS, No, Type, Size oil diffusion Galileo
 16.000.1/s

ION SOURCES

Pig Hot Filament

INJECTION SYSTEM

Internal ion source

EXTRACTION SYSTEM

Electromagnetic and magnetostatic channels

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 500 m²; movable m²
 TARGET STATIONS 3 in
 STATIONS served at same time, max
 MAG SPECTROGRAPH, type 102°N=1/2
 COMPUTER model micro-processors
 OTHER FACILITIES on-line Mass. Spectrometer
 Isocèle II

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (µA)	
	Goal	Achieved	Internal	External
P	168 to 201	3	5	expected 4
d	83 to 107	4	9	7
3He ⁺⁺	233 to 281	2	3.2	2.5
4He ⁺⁺	166 to 216	2	3.2	2.5

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED	CONDITIONS	
	MEASURED	CONDITIONS
PULSE WIDTH RF deg	µ A of	MeV ions
PHASE EXC. max RF deg	µ A of	MeV ions
EXTRACT eff 80. %	µ A of	201 MeV P ions
RESOL ΔE/E 0,7. %	µ A of	201 MeV P ions
EMITTANCE (π mm. mrad)	{ 9 axial } { 1,9 rad }	µ A of 201 MeV P

OPERATING PROGRAMS, time distribution

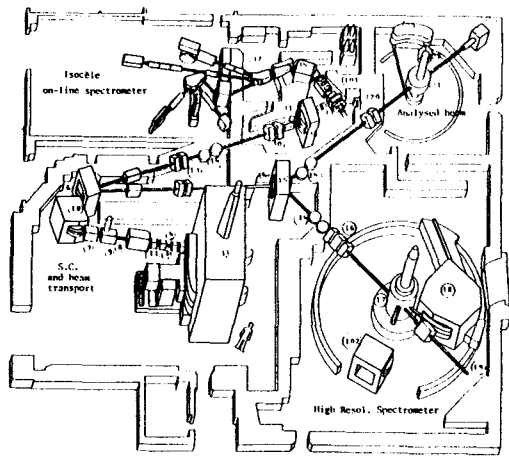
BASIC NUCLEAR PHYSICS 99% SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT ISOTOPE PRODUCTIONS 1%

REFERENCES/NOTES

- 1)
- 2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.

First variable-energy synchrocyclotron. a new rotating condenser which works at 700 HZ modulation rate is under test.



PANORAMIC VIEW OF THE ORSAY-SYNCHROCYCLOTRON