

**ENTRY No.** FM-4

NAME OF MACHINE ORSAY 200 MeV DATE SYNCHROCYCLOTRON DATE Sept. 1981  
 INSTITUTION Institut de Physique Nucléaire  
 ADDRESS 91406 ORSAY, B.P. n. 1 FRANCE  
 TEL 941.71.65. TELEX FACORS. 692.166.F.  
 IN CHARGE M. MORLET, P. DEBRAY. REPORTED BY P. DEBRAY.

**HISTORY AND STATUS**

DESIGN, date 1972 Model tests 1972-1973.  
 ENG DESIGN, date 1973  
 CONSTRUCTION, date Sept. 1975  
 FIRST BEAM, date (or goal) 20.06.1977  
 MAJOR ALTERATIONS

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

**ACCELERATOR STAFF, OPERATION AND DEVELOPMENT**

SCIENTISTS 1 ENGINEERS 2  
 TECHNICIANS 22 CRAFTS 3  
 GRAD STUDENTS involved during year  
 OPERATED BY Research staff or 8 Operators  
 OPERATION 104 hr/wk, On target 96 hr/wk  
 TIME DISTR. in house 75 % , Outside 25 %  
 BUDGET, op & dev 700 KF  
 FUNDED BY IN2P3.

**RESEARCH STAFF**, not included above  
 USERS, in house 40 outside 35  
 GRAD STUDENTS involved during year  
 RESEARCH BUDGET, in house  
 FUNDED BY

**MAGNET**

POLE FACE, diameter (compact) 320 cm, R extraction 140 cm  
 R injection 1 cm  
 GAP, min 30 cm, Field 16.07 kG }  
 max 40 cm, Field 16.07 kG } at 630,000 Ampere turns  
 AVERAGE FIELD at R ext 15.31 kG }  
 B max/ <B >

NUMBER OF SECTORS { compact } Spiral, max .. deg  
 { separated }  
 SECTOR ANGLE (SSC) .. deg  
 TRIMMING COILS .. 1

CONDUCTOR, material and type copper  
 STORED ENERGY (cryogenic) MJ  
 POWER: main coils 350 max, kW ; current stability  $\pm 3 \cdot 10^{-5}$   
 trimming coils 40 max, kW ; current stability  $\pm 3 \cdot 10^{-5}$   
 WEIGHT: Fe 900 tons ; coils 22 tons  
 COOLING system De-ionized water  
 ION ENERGY (bending limit) E/A = 225 q<sup>2</sup>/a<sup>2</sup> MeV/amu  
 (focusing limit) E/A = q/a MeV/amu

**ACCELERATION SYSTEM**

DEES, number 1 ; angle 180 deg  
 BEAM APERTURE 6 cm ; DC Bias 1 kV  
 TUNED by, coarse fine  
 RF 25 to 10 MHz, stable  $\pm$   
 Orb F 25 to 10 MHz  
 HARMONICS, RF/Orb F, used  
 DEE - Gnd, max 15 kV, min gap 0.4 cm  
 STABILITY, (pk-pk noise)/(pk RF volt)  
 ENERGY GAIN, max 20 kV/turn  
 RF PHASE, stable to  $\pm$  deg  
 RF POWER input, max 30 kW  
 FREQUENCY MODULATION, rate 440 /s  
 modulator, type rotating condenser  
 beam pulse, width 50 to 100 micro-seconde

**VACUUM SYSTEM**

OPERATING PRESSURE 2 to 5 Torr or mbar  
 PUMPS, No, Type, Size oil diffusion Galileo  
 16,000 l/s

**ION SOURCES**

...PIG.HOT.FILAMENT

**INJECTION SYSTEM**

...Internal ion source

**EXTRACTION SYSTEM**

...Electromagnetic and magnetostatic channels

**FACILITIES FOR RESEARCH**

SHIELDED AREA, fixed 500 m<sup>2</sup> ; movable m<sup>2</sup>  
 TARGET STATIONS 3 in 3 rooms  
 STATIONS served at same time, max  
 MAG SPECTROGRAPH, type 120° N = 1/2  
 COMPUTER model microprocessors  
 OTHER FACILITIES One-line Mass Spectrometer Isocele II

**CHARACTERISTIC BEAMS**

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
P	170 to 200	3	2,4	
d	90 to 108	4	3	
<sup>3</sup> He <sup>++</sup>	238 to 283	1.5	1	
<sup>4</sup> He	182 to 220	1.5	1	

SECONDARY (part/s)

**BEAM PROPERTIES**

MEASURED	CONDITIONS	
	MEASURED	CONDITIONS
PULSE WIDTH RF deg	μA of MeV ions	
PHASE EXC, max RF deg	μA of MeV ions	
EXTRACT eff 80 %	μA of 200 MeV p ions	
RESOL ΔE/E 0.7 %	μA of 200 MeV p ions	
EMITTANCE		
(π mm. mrad) { 9 axial }	μA of 200 MeV p ions	
{ 19 fl. rad }		

**OPERATING PROGRAMS**, time distribution

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

**REFERENCES/NOTES**

**PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS**

