

ENTRY NO. FM-5

NAME OF MACHINE ORSAY 200 MeV Synchrocyclotron DATE 1978  
 INSTITUTION Institut de Physique Nucléaire  
 ADDRESS 91400 Orsay B.P. n° 1

IN CHARGE H. Langevin - A. Laisné REPORTED by P. Debray

**HISTORY AND STATUS**

DESIGN, date 1972 MODEL tests 72-73  
 ENG. DESIGN, date 1973  
 CONSTRUCTION, date Sept. 1975  
 FIRST BEAM date (or goal) 20-6-1977  
 MAJOR ALTERATIONS \_\_\_\_\_

OPERATION, 48 hr/wk; On Target \_\_\_\_\_ hr/wk  
 TIME DIST., in house \_\_\_\_\_ %, outside 100 %  
 USERS' SCHEDULING CYCLE \_\_\_\_\_ weeks

COST, ACCELERATOR env. 10 MF  
 COST, FACILITY, total env. 20 MF

FUNDED BY Institut National de Physique Nucléaire et de Physique des Particules (IN2P3)  
 ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS \_\_\_\_\_ ENGINEERS 2  
 TECHNICIANS 6 CRAFTS 5

GRAD STUDENTS involved during year \_\_\_\_\_  
 OPERATED BY \_\_\_\_\_ Res staff or 6 Operators

BUDGET, op & dev \_\_\_\_\_  
 FUNDED BY IN2P3

**RESEARCH STAFF, not included above**

USERS, in house \_\_\_\_\_ outside \_\_\_\_\_  
 GRAD STUDENTS involved during year \_\_\_\_\_  
 RES. BUDGET, in house \_\_\_\_\_  
 FUNDED BY \_\_\_\_\_

**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 deg n = 1/2  
 COMPUTER, model IBM 360-50

OTHER FACILITIES On-line Mass Spectrometer  
Isocèle II

**REFERENCES/NOTES**

**MAGNET**

POLE FACE diameter 320 cm; R extraction 140 cm  
 GAP, min 30 cm; Field \_\_\_\_\_ kG } at 0.63x10<sup>6</sup>  
 max 40 cm; Field 16, 15 kG } ampere turns

AVERAGE FIELD at R ext 14.8 kG  
 CURRENT STABILITY + 20 parts/10<sup>6</sup>; B<sub>max</sub>/(B) \_\_\_\_\_

NUMBER OF SECTORS \_\_\_\_\_; SPIRAL, max \_\_\_\_\_ deg  
 POLE FACE COIL PAIRS: AVF 1 /sec;

Harmonic correction \_\_\_\_\_  
 Rad grad \_\_\_\_\_ /sec or Circ coils 1

WEIGHT: Fe \_\_\_\_\_ tons; Coils \_\_\_\_\_ tons  
 CONDUCTOR, Material and type Cu

STORED ENERGY \_\_\_\_\_ MJ  
 COOLING SYSTEM De-ionized water

POWER: Main coils 350 max, kW  
 Trimming coils \_\_\_\_\_ max, kW

YOKE/POLE AREA 100 %  
 SECTOR ANGLE (Sep Sec) \_\_\_\_\_ deg

ION ENERGY (Bending limit) E/A = 223 q<sup>2</sup>/A<sup>2</sup> MeV  
 (Focusing limit) E/A = 223 q/A MeV

**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 ± \_\_\_\_\_ /10<sup>6</sup>

Orb F 25 to 10 MHz; GAIN, max \_\_\_\_\_ kV/turn  
 HARMONICS, RF/Orb F, used 3

DEE-Gnd, max 20 kV, min gap 0.4 cm  
 STABILITY, (pk-pk noise)/(pk RF volt) \_\_\_\_\_

RF PHASE stable to ± \_\_\_\_\_ deg  
 RF POWER input, max 100 kW

RF PROTECT circuit, speed 5 μsec  
 Type Blocking of the Amplitude Modulator

FREQUENCY MODULATION, rate 430 ; 700-1100 sec  
 MODULATOR, type Rotating condenser

BEAM PULSE, width \_\_\_\_\_

**VACUUM SYSTEM**

PUMPS, No., Type, Size 1 diff. pump (16000 l.s)

OPERATING PRESSURE 1-5 μTorr,  
 PUMPDOWN TIME 40 hrs

**ION SOURCES/INJECTION SYSTEM**

Pulsed Livingstone cathode

EXTRACTION SYSTEM Regenerative Extraction  
E.M. and M.S. channels.

**CONTROL SYSTEM**

ENTRY NO. FM-5 (cont.)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	P		200 and 170
	d		108 and 90
	$3\text{He}^+$		283 and 238
	$4\text{He}^{++}$		220 and 182
CURRENT		( $\mu\text{A}$ )	( $\mu\text{A}$ )
	Internal		
	P	10	3
	d	10	3
	$3\text{He}^+$	10	3
	External		
P	7		
d	7		
He	7		
Secondary		(part/s)	(part/s)

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	RF deg	$\mu\text{A}$ of MeV
Phase Exc, max	RF deg	$\mu\text{A}$ of MeV
Extract Eff	70 %	$\mu\text{A}$ of MeV
Res, $\Delta E/E$	%	$\mu\text{A}$ of MeV
Emittance	(mm-mrad) $\left\{ \begin{array}{l} 8\pi \text{ axial} \\ 20\pi \text{ radial} \end{array} \right\}$ 0.5 $\mu\text{A}$ of 200 MeV P	

OPERATING PROGRAMS, time dist

Basic Nuclear Physics	50	%
Solid State Physics		%
Bio-Medical Applications		%
Isotope Production	30	%
Development	10	%
		%
		%

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES

