ENTRY No. 17

NAME OF MACHINE S.A.R.A. Injector DATE July 15th, 1981
INSTITUTION INSTITUT DES SCIENCES NUCLEAIRES
ADDRESS 53, avenue des Martyrs 38026 GRENOBLE CEDEX - FRANCE
TEL (76) 47-66-36 TELEX 320301 F
IN CHARGE J.M. LOISEAUX REPORTED BY J.M. LOISEAUX

HISTORY AND STATUS

DESIGN, date 1962 Model tests 1963
ENG DESIGN, date 1963 - 1965
CONSTRUCTION, date 1963 - 1967
FIRST BEAM, date (or goal) July 1968
MAJOR ALTERATIONS
COST, ACCELERATOR $ 2.10^6
COST, FACILITY, total $ 6.10^6
FUNDED BY I.N2.P3 / CNRS

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 10
TECHNICIANS 30 CRAFTS 1
GRAD STUDENTS involved during year
OPERATED BY Research staff or Operators
OPERATION 144 hr/wk, On target 130 hr/wk
TIME DISTR. in house 80 %, Outside 20 %
BUDGET, op & dev 2.10^5
FUNDED BY I.N2.P3. / CNRS

RESEARCH STAFF, not included above

USERS, in house 50 outside 10
GRAD STUDENTS involved during year 4
RESEARCH BUDGET, in house
FUNDED BY I.N2.P3. / CNRS

MAGNET

POLE FACE, diameter (compact) 212 cm, R extraction 88. cm
R injection cm
GAP, min 16. cm, Field 19. kG
max 36. cm, Field 12. kG
at 360.10^3 Ampere turns
AVERAGE FIELD at R ext 16. kG
B max/ <B> 1.2
NUMBER OF SECTORS compact 4 / separated — Spiral, max 40 deg
SECTOR ANGLE (SSC) deg
TRIMMING COILS 11 circular
4 harmonics
CONDUCTOR, material and type Copper 18x13 mm bore Ø 10
STORED ENERGY (cryogenic) MJ
POWER : main coils 270. max, kW ; current stability 1.10^-5
trimming coils 10. max, kW ; current stability 1.10^-5
WEIGHT : Fe 200. tons ; coils 8. tons
COOLING system Water
ION ENERGY (bending limit) E/A = 90. q²/a² MeV/amu
(focusing limit) E/A = q /a MeV/amu

ACCELERATION SYSTEM

DEES, number 2 ; angle 80. deg
BEAM APERTURE 4. cm ; DC Bias kV
TUNED by, coarse M.P. fine
RF 10.7 to 21. mHz, stable ± 10^-6
Orb F 13.6 to 21. mHz
HARMONICS, RF/Orb F, used 1, 2, 3
DEE - Gnd, max 60 kV, min gap cm
STABILITY, (pk-pk noise)/(pk RF volt) 10^-4
ENERGY GAIN, max 240 kV/turn
RF PHASE, stable to ± 10 deg
RF POWER input, max 2 x 20 kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 10^{-6} Torr or mbar
PUMPS, No, Type, Size 2 XNRC oil diffusion

ION SOURCES

Livingston, PIG Internal, PIG polarized external

INJECTION SYSTEM

Electrostatic inflector for axial injection

EXTRACTION SYSTEM

Electrostatic deflector + magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 300. m² ; movable 500. m²
TARGET STATIONS 7. in 5. rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type Narrow range 0,9 GeV/C
COMPUTER model PDP 11/34 on line +
OTHER FACILITIES PDP 11/34 off line

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
^{12}P		60	40	20
C^{3+}	63	63	13	6
SECONDARY				(part/s)

BEAM PROPERTIES

	MEASURED		CONDITIONS		
PULSE WIDTH	5.	RF deg	15.	pμ A of 63. MeV	C^{3+} ions
PHASE EXC, max		RF deg		pμ A of	MeV ions
EXTRACT eff	60.	%	5.	pμ A of 63. MeV	C^{3+} ions
RESOL ΔE/E	0,4	%		pμ A of	MeV ions
EMITTANCE (π mm. mrad)	15 axial / 17. rad		.5	pμA of 63. MeV	C^{3+} ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 90 SOLID STATES PHYSICS
BIOMEDICAL APPLICAT. 5. % ISOTOPE PRODUCTIONS
^{10}Be 4. %

REFERENCES/NOTES

Annales de Radioélectricité T. XXI n° April 1966 pp 122 - 150.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

Injector of the two cyclotrons system S.A.R.A. described in the proceedings.