

ENTRY No. 22

NAME OF MACHINE . SARA DATE ... April, 1989
 INSTITUTION INSTITUT DES SCIENCES NUCLEAIRES
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HISTORY AND STATUS

DESIGN, date 1976 Model tests 1977
 ENG DESIGN, date 1977
 CONSTRUCTION, date 1978-1981
 FIRST BEAM, date (or goal) February 1982
 MAJOR ALTERATIONS

COST, ACCELERATOR \$ 1.6 . 10⁶
 COST, FACILITY, total \$ 6. . 10⁶
 FUNDED BY I. N2. P3/C. N. R. S.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
 SCIENTISTS 1 ENGINEERS 9
 TECHNICIANS 28 CRAFTS 1

GRAD STUDENTS involved during year
 OPERATED BY Research staff or 9 Operators
 OPERATION 144 hr/wk, On target 130 hr/wk
 TIME DISTR. in house % , Outside %
 BUDGET, op & dev 10⁶ \$ including injector

FUNDED BY
RESEARCH STAFF, not included above
 USERS, in house outside

GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house
 FUNDED BY

MAGNET
 POLE FACE, diameter (compact) cm, R extraction cm
 R injection <.88> cm
 GAP, min 6 cm, Field 16.5 kG } at 100.10³
 max cm, Field kG }
 AVERAGE FIELD at R ext kG } Ampere turns
 B max/

NUMBER OF SECTORS { compact } Spiral, max Δ deg
 separated 4
 SECTOR ANGLE (SSC) 48 deg
 TRIMMING COILS 15 + 2 harmonic

CONDUCTOR, material and type Copper 14 x 14 mm Ø 7 bore ..
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 400 max, kW ; current stability 4 . 10⁻⁶
 trimming coils max, kW ; current stability 5 . 10⁻⁵

WEIGHT: Fe 400 tons ; coils 5 tons
 COOLING system Water
 ION ENERGY (bending limit) E/A = 160 q²/a² MeV/amu
 (focusing limit) E/A = q²/a² MeV/amu

ACCELERATION SYSTEM

DEES, number 2 ; angle 34 deg
 BEAM APERTURE 3 cm ; DC Bias kV
 TUNED by, coarse 2 panels fine
 RF 21 to 32 MHz, stable ± 10⁻⁸
 Orb F 3.5 to 8 MHz
 HARMONICS, RF/Orb F, used 4, 5, 6, 7
 DEE - Gnd, max kV, min gap cm
 STABILITY, (pk-pk noise)/(pk RF volt) 10⁻⁴
 ENERGY GAIN, max 320 kV/turn
 RF PHASE, stable to ± 0.1 deg
 RF POWER input, max 2 x 60 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 5 . 10⁻⁷ Torr or mbar
 PUMPS, No, Type, Size 6 oil diffusion 5 000 l/s

ION SOURCES

See SARA Injector

INJECTION SYSTEM

Compact Cyclotron preceding entry

EXTRACTION SYSTEM

Electrostatic Inflector, septum magnet

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 300 m² ; movable 500 m²
 TARGET STATIONS 7 in 6 rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type Narrow range 0.9 GeV/c

COMPUTER model 680X0 based VME Multiprocessor system

OTHER FACILITIES Helium jet - on line isotope separator

0.2-5 m reaction chamber

4 π particle multidetector

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (μA)	
	Goal	Achieved	Internal	External
16O ⁸⁺		38 MeV/A		200 eμA
20Ne ¹⁰⁺		30 MeV/A		600 eμA
40Ar ¹⁷		30 MeV/A		200 eμA

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 10 RF deg μA of MeV ions
 PHASE EXC, max RF deg μA of MeV ions
 EXTRACT eff 70 % μA of MeV ions
 RESOL ΔE/E 0.5 % μA of MeV ions
 EMITTANCE
 (π mm. mrad) { 20 axial } μA of MeV ions
 { 10 rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 90% SOLID STATES PHYSICS 10%
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS

REFERENCES/NOTES

1) SARA low cost heavy ion accelerator for 10 to 40 MeV/A
 IEEE Trans. on NS NS-30 N° 4 August 1983.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

See preceding entry

