Entry: C 19 — **Date**: june 1998

Machine Name: SARA (injector) — **Institution**: IN2P3/CNRS

Address: INSTITUT DES SCIENCES NUCLÉAIRES 53 Avenue de Martyrs F 38026 Grenoble Cedex FRANCE

In Charge of the cyclotron: D.BARNEOUD, M.FRUNEAU

Tel: 33 (0)4 76 28 41 24 — **Web**: isnwww.in2p3.fr

Fax: 33 (0)4 76 28 41 43 — **E-mail: FRUNEAU@ISN.IN2P3.FR**

HISTORY

Design by: CSF

Construction time: 1963-1967

First beam: 1968

CHARACTERISTIC BEAMS

ions / energy (MeV/n) **/ current** (pps) **/ power** (W) **:**

- d/10	MeV/n	$3.8\ 10^{13}$	pps
- $_{18}O^{5+}$/5.5	MeV/n	$1.2\ 10^{12}$	pps
- $_{40}Ca^{11+}$/6.4	MeV/n	$8.0\ 10^{11}$	pps
- $_{64}Ni^{17+}$/5.9	MeV/n	$4.0\ 10^{10}$	pps

transmission efficiency (total)

- **typical**: 12 % - **best**: 15 %

transverse emittance (rms)

- **vertical**: 15 π mmmrad
- **horizontal**: 17π mmmrad

longitudinal emittance (rms) 0.4 % ΔE/E,. 10 deg RF

USES

basic research: % **therapy**: %

development: % **isotope production**: %

other applications: 95 % **maintenance**: %

beam tuning: 5 %

total time: 1500 h/year

TECHNICAL DATA

a) magnet

type: H compact

Kb: 90 MeV/n **Kf**: 60 MeV/n

average field (min-max): 1.6 (1.2/1.9) T

number of magnet sectors: 4

- **angle**: deg
- **spiral (max)**: 40 deg

pole parameters

- **diameter**: 2.12 m
- **injection radius**: 0.02 m
- **extraction radius**: 0.88 m

hill gap: 0.016 m **valley gap**: 0.036- m

field trimming

- **trim coils**
  - **number**: 11
  - **current (max)**: 200 A
- **harmonic coils**
  - **number**: 4
  - **current (max)**: 200 A
- **others**
  - **number**:
  - **current (max)**: A

main coils:

- **number**: 2
- **Ampere-turns**: 360000 A.T.
- **current**: 1100 A

stored energy: MJ

weight : - iron: 200 t - **coils**: t

power

- **main coils (total)**: 270 kW
- **trim coils (total max)**: 100 kW
- **refrigerator (cryogenic)**: kW

b) RF

- acceleration

- **frequency range**: 10.5 to 16 MHz
- **harmonic modes**: 2.3
- **number of dees**: 2
- **angular aperture**: 80 deg
- **voltage:- average (min-max)**: 60 kV
  - **variation with radius**:
  -
- **power in (max)**: 30 kW
- **stability: - phase**: 0.1 deg - **voltage**: 0.01 %

- other cavities

- **purpose**:
- **frequency range**: MHz
- **region of influence**: m
- **voltage (max)**: kV
- **power in (max)**: kW
- **stability:- phase**: deg - **voltage**: %

c) injection

- internal source:

- external (radial/axial): axial,spiral inflector

- **elements**: 22 m long injection channel for 2 sources
  Belmont spiral inflector
- **source voltage**: 10 to 20 kV kV
- **injection energy**: 1.5 keV/n to 10 keV/n MeV/n
- **buncher**: 1 double gap, sinus first harmonic

- injection efficiency: 20 %

d) ion sources/injector

2 ECR : CAPRICE 0.8 T and CAPRICE 1 T

e) extraction

- elements, characteristics:

- 1 electrostatic channel
- 1 ironless 2000 A magnetic hannel
-
-

- efficiency

- **typical**: 75 %- **best**: %

f) vacuum

- **pumps**: 2 NRC oil diffusion
- **achieved vacuum** 10^{-4} Pa

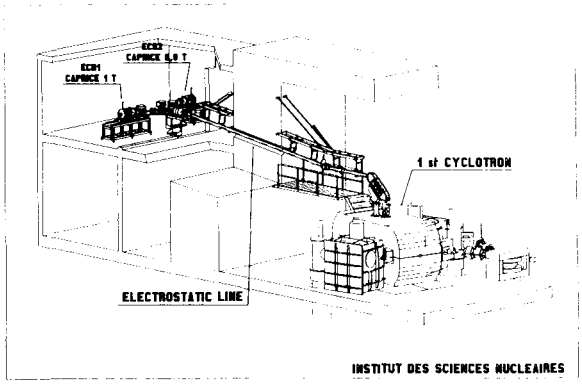
REFERENCES

Annales de radioélectricité XXI April 1996 pp 121-150

EXPERIMENTAL FACILITIES

Fast neutron irradiation facility 3 10^{11} n/s

PLAN VIEW OF FACILITY



COMMENTS

Current operation will cease on 01/08/1998