

Entry: **C44**
 Machine Name: AGOR
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HISTORY

Design by: IPN (Orsay) + KVI (Groningen)
 Construction time: 1987 - 1994
 First beam: extracted: 1994 (Orsay), 1996 (Groningen)

CHARACTERISTIC BEAMS

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

- protons: 130-200 MeV < 1 micro-A
- Q/A = 0.5: 35 - 95 MeV / A
- Q/A = 0.25: 10 - 30 MeV / A
- Q/A = 0.1: 6 MeV / A

transmission efficiency (total)

- typical: 20 % - best: 30 %

transverse emittance (rms)

- vertical: 6π mmmrad
- horizontal: 3π mmmrad

longitudinal emittance (rms) $2 \cdot 10^3 \times 15 \text{ deg } \Delta E/E \cdot \text{deg RF}$

USES

basic research: 60 % therapy: 0 %
 development: 10 % isotope production: 0 %
 other applications: 10 % maintenance: 20 %
 beam tuning:
 total time: 3500 h/year (1997)

TECHNICAL DATA

a) magnet

type: compact, solid pole
 Kb: 600 MeV/A Kf: 220 MeV/A
 average field (min-max): 1.70 - 4.05 T
 number of magnet sectors: 3
 - angle: 60 deg
 - spiral (max): deg

pole parameters

- diameter: 0.94
- injection radius: 0.025
- extraction radius: .89 m

hill gap: 0.07m valley gap: 1m

field trimming

- trim coils
 - number: 15
 - current (max): 300 A
- harmonic coils
 - number: 4
 - current (max): 300 A (sectorized trim coils)
- others
 - number: -
 - current (max): -

main coils:

- number: 2 x 2
- Ampere-turns: A.T.
- current: 900 A / 1800 A

stored energy: 56 MJ

weight : - iron: 320 t coils: 30 t (including cryostat)

power

- main coils (total): 0 kW
- trim coils (total max): 30 kW
- refrigerator (cryogenic): 250 kW

b) RF

- acceleration

- frequency range: 24-62 MHz
- harmonic modes: 2, 3, 4
- number of dees: 3
- angular aperture: 60 deg
- voltage: - average (min-max): 20 - 80 kV
- variation with radius: 1.3
- power in (max): 25 kW (rf power)
- stability: - phase: 0.2 deg - voltage: 0.01 %

- other cavities: none

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

c) injection

- internal source: none
- external (radial/axial): axial
- elements:
- source voltage: < 30 kV
- injection energy:
- buncher: double gap
- injection efficiency: 10-35 %

d) ion sources/injector

- Multicusp (singly charged and alpha's)
- ECR
- Polarised p and d

e) extraction

- elements, characteristics:
 - ESD: 50 kV / 6 mm
 - EMC-1: $\Delta B < 0.2 \text{ T}, \text{dB/dx} < 13 \text{ T/m}$
 - EMC-2: $\Delta B < 0.4 \text{ T}, \text{dB/dx} < 22 \text{ T/m}$
 - Qpole: $\Delta B_{\text{hor}} < 0.1 \text{ T}, \Delta B_{\text{ver}} < 0.05 \text{ T}, \text{dB/dx} < 36 \text{ T/m}$
- efficiency
 - typical: 65 % best: 85 %

f) vacuum

- pumps:
 - 2 turbomolecular, 3 cryogenic
- achieved vacuum: $2 \times 10^{-4} \text{ Pa}$ (without cryopumps)

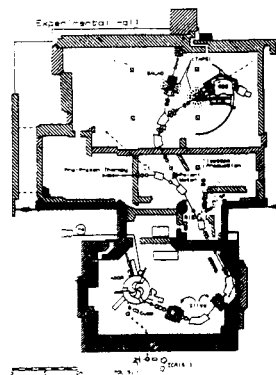
REFERENCES

International Conferences on Cyclotrons and their Applications:
 Tokyo, Berlin, Vancaouver, Cape Town.

EXPERIMENTAL FACILITIES

- BBS Spectrometer; Plastic Ball detector
- Small Angle Large Acceptance (SALAD) detector
- Set-up for radiobiology experiments.

PLAN VIEW OF FACILITY



COMMENTS

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