

ENTRY NO: C-38
Machine Name: NAC Separated-Sector Cyclotron
Date: 6/8/01 9:30:31 AM
Institution: National Accelerator Centre
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HISTORY

Designed By: National Accelerator staff
Construction Dates: 1979 - 1985
First Beam Date: October 1985

CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)	/current(pps)	/power(w)
p	200	1.87E13	600
p	66	6.24E14	6600
18O4+	4.7	3.1E11	17
129Xe22+	6.1	1.4E10	39.5

transmission efficiency(source to extract beam)

typical: 99.8% - **best:** 100%

transverse emittance

emittance definition: RMS

vertical: 2.7π mm mrad

horizontal: 0.8π mm mrad

longitudinal: $0.07(\Delta) E/E) \% \times \text{deg RF}$

USES

basic research: 17% **therapy:** 16%
development: 0.8% **isotope production:** 27.7%
other: 0% **maintenance:** 17%
beam tuning: 8.5% **Total Time:** 8477h/year

TECHNICAL DATA

a)magnet: **type:** sector magnets
Kb: 200MeV/A **Kf:** 200MeV/A
average field (min/max): 0.517 (1.256/0) T
number of magnet sectors: 4
hill angular width: 34 deg
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spiral (max): 0 deg
pole parameters
diameter: 4.43 m
injection radius: 0.952 m
extraction radius: 4.156 m
hill gap: 0.066m **valley gap:** infm
trim coils
-number: 29x2
-current(max): 500 A-turns
harmonic coils
-number: xNsectorsx2
-current(max): A-turns
main coils
number: 1x2
total ampere-turns: 80 000 A-turns
current: 1600 A
stored energy: 1.5MJ
weight - iron: 1400t **coils:** 5.8t
power
main coils (total): 650 kW
trim coils (total max): kW
refrigerator (cryogenic): kW
b)RF
acceleration
frequency range: 6 - 26MHz

harmonic modes: 4 and 12
number of dees: 2
number of cavities: 4
dee angular width: 49degrees
voltage
at injection: 184kV(peak to ground, max)
at extraction: 230kV(peak to ground, max)
peak: 230kV(peak to ground, max)
line power(max): 2x80kW
stability
phase: 0.1 deg
voltage: 0.1%
injection
c)ion source:
external injection: radial
components: 2 bending magnets, 1 magnetic inflection channel
source bias voltage: kV
injection energy: 1.4 - 8MeV/N
buncher: Double-gap, sine wave
injection efficiency: 100%
d)injector: Solid pole injector cyclotrons SPC1 and SPC2
e)extraction
2 septum magnets
efficiency
typical: 99.8%
best: 100%
f)vacuum
pumps: 4 Rotary vane 120 cub m/h, 4 Roots 350 cub m/h, 6 achieved vacuum: 7E-5Pa
REFERENCES
Proc. 11th Conf. on Cyclotrons and their Appl.(1986)p6 Proc.
12th Conf. on Cyclotrons and their Appl.(1989)p80
EXPERIMENTAL FACILITIES
A 66 MeV isocentric gantry for neutron therapy, a fixed horizontal beamline for proton therapy, a high-energy gamma-ray detectors array AFRODITE, a 1.5m scattering chamber, a neutron beam facility, a triple-arm gamma-correlation table and a K600 QDD magnet spectrometer
COMMENTS