

ENTRY NO. C52 Date October 31, 1995
 Name of Machine NAC Injector Cyclotron 2
 Institution National Accelerator Centre
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HISTORY

MILESTONE DATES:

Design 1986 - 1992 Model Tests
 Construction 1989 - 1993 First Beam December 1993

DESIGN/CONSTRUCTION BY:

in house Yes other Various Contracts

COST: Accelerator Facility

FUNDED BY:

STATUS (See NAC Separated-Sector Cyclotron)

STAFF: Machine

Scientists Engineers
 Technicians Students

Research (in house/external)

Scientists / Engineers /
 Technicians / Students /

BUDGET: Machine Funded by
 Research Funded by

TIME DISTRIBUTION:

Basic Research (in house/external) % / %
 Applied Program (in house/external) % / %
 Maintenance % Development %

MAGNET

POLE PARAMETERS:

Diameter 11.6 cm R_{extract} 47.6 cm R_{inject} cm

HILL PARAMETERS: Gap (min) cm B_{max} T
 (@ 1.55×10^5 AT) Gap (max) 15.6 cm B_{min} 1.24 T

VALLEY PARAMETERS: Gap (min) cm B_{max} T
 (@ 1.55×10^5 AT) Gap (max) 25.0 cm B_{min} 0.75 T

AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ 0.3 T $\langle B \rangle_{\text{max}}$ 1.0 T

NUMBER OF SECTORS: compact/separated 4 /
 sector angle 45° deg. spiral (max) deg.

FIELD TRIMMING: Trim Coils 6
 Harmonic Coils 2
 Other Cone coils: 2

CURRENT: Main Coils 690 Amps Stability 10^{-5}
 Trim Coils 200 Amps Stability 10^{-3}
 Stored Energy (cryogenic) MJ

WEIGHT: Iron 54.5 tons Conductor 1.85 tons copper

ION ENERGY: Bending Limit $E/A = 11$ q²/A² MeV/u
 Focusing Limit $E/A =$ q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: Two $\lambda/4$ resonators with 90° dees
 No. of Gaps/turn 4 $dE/dn(\text{max})$ 0.24 MeV/q
 Voltage (max) 0.060 MV Harmonic f_H/f_{ion} 2.6
 Freq 8.6 - 26 MHz Power in(max) 2×0.025 MW
 Stability: Phase 0.1 deg Voltage 10^{-3}

OTHER CAVITIES (Flattopping or otherwise):

Description:
 Region of Influence: R_{min} cm R_{max} cm
 No. of Gaps/turn $dE/dn(\text{max})$ MeV/q
 Voltage (max) MV Harmonic f_H/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 8×10^{-5} Pa
 PUMPS: (No. and type) 1 Turbo $2.2 \text{ m}^3/\text{s}$, 1 cryo $10 \text{ m}^3/\text{s}$
 and 2 LN₂ cryo $18 \text{ m}^3/\text{s}$

ION SOURCE(S)

Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a) ECR			p, to Xe
(b) Pol. Source (At. B.)	0.028	0.9	p. and d
(c)			
(d)			

INJECTION SYSTEM

3 Interchangeable spiral inflectors Efficiency 40:50:30 %

EXTRACTION SYSTEM

Electrostatic + 2 magnetic channels Efficiency 75:80:50 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μ A)	
		Internal	External
(a) protons	3.15	110	82
(b) C	0.25 - 1.59	0.92	0.8
(c) Ar	0.36	0.38	0.19
(d) pol. protons	3.15, 5.32	3.8, 1.4	2.0, 0.1

Secondary Particles	E (MeV)	part/sec
(a)		
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:

For μ A of MeV/u ions
 $\Delta E/E$ % $\Delta\phi$ ° r_f
 $\epsilon_n = \beta\gamma\epsilon$ x π mm mrad z π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: m² Moveable m²
 Target Stations: No. Served At Same Time:

MAGNETIC SPECTROMETERS:

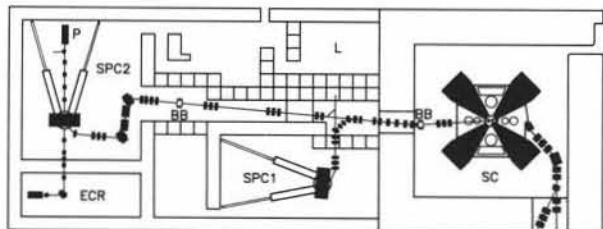
OTHER FACILITIES:

See NAC Separated-Sector Cyclotron

REFERENCES/NOTES

(a) Proc. Eleventh Int. Conf., 515 (1986)
 (b) Proceedings of this conference

PLAN VIEW OF FACILITY, COMMENTS



BB Beamline buncher
 ECR ECR ion source (basement)
 L Low energy experimental area
 P Polarized ion source (basement)
 SPC1 Solid pole injector cyclotron for light ions
 SPC2 Solid pole injector cyclotron for heavy or polarized ions
 SC Separated-sector cyclotron