

ENTRY NO. C50 Date June 15/92
 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 engineering 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) % / %
 Development % Maintenance %

MAGNET

POLE PARAMETERS:
 Diameter 116 cm R_{extract} 47.6 cm R_{inject} cm
 HILL PARAMETERS: Gap (min) cm B_{max} T
 (@ 1.55x10⁵ AT) Gap (max) 15.6 cm B_{min} 1.24 T
 VALLEY PARAMETERS: Gap (min) cm B_{max} T
 (@ 1.55x10⁵ AT) Gap (max) 25.0 cm B_{min} 0.75 T
 AVERAGE FIELD: < B >_{min} 0.3 T < B >_{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 A Amps Stability 10⁻⁵
 Trim Coils 200 A Amps Stability 10⁻⁴
 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
 Focussing Limit E/A = q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
 Description: Two λ/4 resonators with 90° dees
 No. of Gaps/turn 4 dE/dn(max) 0.24 MeV/q
 Voltage(max) 0.060 MV Harmonic f_{rf}/f_{ion} 2.6
 Freq 6.26 MHz Power in(max) 2 x 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(max) MeV/q
 Voltage(max) MV Harmonic f_{rf}/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 8 x 10⁻⁵ Pa
 PUMPS: No. and type 1 Turbo 2.2 m³/s, 1 cryo 10 m³/s
 and 2 Lk. cryo 18 m³/s

ION SOURCE(S)

Type	Intensity (mA)	ϕ (πmm mrad)	ε _n = βγϵ	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 deflectors. Efficiency %

EXTRACTION SYSTEM

Electrostatic+2 magnetic channels. Efficiency %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)	
		Internal	External
(a) protons	2 - 8		
(b) Ar	0.2 - 1.0		
(c) Xe	0.1 - 0.25		
(d)			
Secondary Particles	E (MeV)	part/sec	
(a)			
(b)			
(c)			

EXTRACTED BEAM PROPERTIES:

For μA of MeV/u ions
 ΔE/E % Δφ °rf
 ε_n = βγϵ x πmm mrad z πmm mrad

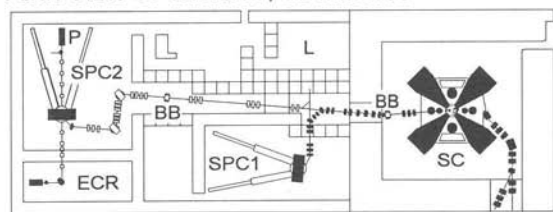
FACILITIES FOR RESEARCH

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