

**ENTRY NO:** C-37  
**Machine Name:** NAC Injector Cyclotron 2  
**Date:** 6/11/01 3:54:23 AM  
**Institution:** National Accelerator Centre  
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## HISTORY

**Designed By:** National Accelerator staff  
**Construction Dates:** 1989 - 1993  
**First Beam Date:** December 1993

## CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)	/current(pps)	/power(w)
p	3.15	5.1e14	258
p	8.0	8.2e13	104
40Ar8+	0.36	2.1e12	40
129Xe22+	0.32	5.7e10	8

## transmission efficiency(source to extract beam)

**typical:** 15% - **best:** 30%

## transverse emittance

**emittance definition:** RMS

**vertical:**  $10\pi$  mm mrad

**horizontal:**  $15\pi$  mm mrad

**longitudinal:**  $0.042(\Delta) E/E$ %xdeg RF

## USES

**basic research:** 80%      **therapy:** 0.5%  
**development:** 9%      **isotope production:** 0.5%  
**other:** %      **maintenance:** 3%  
**beam tuning:** 7%      **Total Time:** 4000h/year

## TECHNICAL DATA

**a)magnet:**      **type:** sector magnets

**Kb:** 8MeV/A      **Kf:** 8MeV/A

**average field (min/max):** 1.0 - 0.3 T

**number of magnet sectors:** 4

**hill angular width:** 45hill angular width

**spiral (max):** deg

## pole parameters

**diameter:** 1.16 m

**injection radius:** m

**extraction radius:** 0.476 m

**hill gap:** 0.156m      **valley gap:** 0.250m

## trim coils

-number: 6x2

-current(max): 200 A-turns

## harmonic coils

-number: 2xNsectorsx2

-current(max): 20 A-turns

## main coils

**number:** 1x2

**total ampere-turns:** 154560 A-turns

**current:** 690 A

**stored energy:** 0.1MJ

**weight - iron:** 54.5t      **coils:** 1.85t

## power

**main coils (total):** 46 kW

**trim coils (total max):** 12 kW

**refrigerator (cryogenic):** kW

## b)RF

### acceleration

**frequency range:** 8.6 - 26MHz

**harmonic modes:** 2 and 6

**number of dees:** 2

**number of cavities:** 4

**dee angular width:** 90degrees

## voltage

at injection: kV(peak to ground, max)

at extraction: kV(peak to ground, max)

peak: 60kV(peak to ground, max)

**line power(max):** 2x25kW

## stability

**phase:** 0.1 deg

**voltage:** 0.1%

## injection

**c)ion source:** ECR and Polarized ion source

**external injection:** axial

**components:** 3 spiral inflectors (interchangeable)

**source bias voltage:** 9 - 20kV

**injection energy:**  $1.4e-3$  - 20e-3MeV/N

**buncher:** Double-gap, sine wave

**injection efficiency:** 55 - 70%

## d)injector:

## e)extraction

electrostatic channel 2x magnetic channels

## efficiency

**typical:** 70%

**best:** 90%

## f)vacuum

**pumps:** turbo 2.2 cub m/s, cryopump 10 cub m/s and 2 LN cr

**achieved vacuum:**  $1.7e-5$ Pa

## REFERENCES

Proc. 11th Int. Conf. on Cyclotrons and their Appl.(1985)515

Proc. 15th Int. Conf. on Cyclotrons and their Appl.(1998)625

## EXPERIMENTAL FACILITIES

## COMMENTS