

ENTRY NO. CM1 Date October 9, 1995
Machine Name CYCLONE 3
Manufacturer ION BEAM APPLICATIONS (IBA)
Address Rue Jean Lenoir 6 - 1348 Louvain-la-Neuve, BELG
Tel 32-10-47.58.11 Telex
Fax 32-10-47.58.10 E-MAIL
In Charge: Yves JONGEN Reported by: Françoise VAMECQ

HISTORY AND STATUS

DATES: Design 1989 First Machine 1990
SALES: No. Sold/Operational 4 / 2 Currently Available Y
COST: Accelerator Facility

MAGNET

POLE PARAMETERS:

Diameter 50 cm $R_{\text{extract}} \sim 20.5$ cm $R_{\text{inject}} \sim 2$ cm
HILL PARAMETERS: Gap (min) 3.4 cm $B_{\text{max}} 1.95$ T
(@ AT) Gap (max) cm B_{min} T
VALLEY PARAMETERS: Gap (min) 5 cm $B_{\text{max}} 1.70$ T
(@ AT) Gap (max) cm B_{min} T
AVERAGE FIELD: $\langle B \rangle_{\text{min}} 1.85$ T $\langle B \rangle_{\text{max}}$ T
NUMBER OF SECTORS: compact/separated 4 /
sector angle 40° deg. spiral (max) deg.
FIELD TRIMMING: Trim Coils
Harmonic Coils
Other
CURRENT: Main Coils 225 Amps Stability 10^{-4}
Trim Coils Amps Stability
Stored Energy (cryogenic) MJ
WEIGHT: Iron 5 Tons Conductor 0.5 Tons
ION ENERGY: Bending Limit $E/A = 15.2$ q²/A² MeV/u
Focusing Limit $E/A = 15.2$ q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: 2 x 90° Dees
No. of Gaps/turn 4 $dE/dn(\text{max}) 0.08$ MeV/q
Voltage (max) 0.02 MV Harmonic $f_H/f_{\text{ion}} 2$
Freq 30 MHz Power in(max) 10 kW MW
Stability: Phase $\pm 10\%$ Voltage 10^{-3}

VACUUM SYSTEM

OPERATING PRESSURE: $8 \cdot 10^{-5}$ mbar
PUMPS: (No. and type) 1 x 300 l/sec ODP

ION SOURCE(S)

Type	Intensity (mA)	@	$\epsilon_n = \beta \gamma c$ (mm mrad)	Ion Species
(a) PLC cold	1			deuteron
(b) cathode				

INJECTION SYSTEM

Efficiency %

EXTRACTION SYSTEM

Deflector Efficiency 70 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μA)	Internal	External
(a) deuteron	1.90	100		70
(b)				

EXTRACTED BEAM PROPERTIES:

For μA of MeV/u ions
 $\Delta E/E$ % $\Delta\phi$ °rf
 $\epsilon_n = \beta \gamma c$ x π mm mrad z π mm mrad

REFERENCES/NOTES

(a) EPAC 1990, Y. Jongen et al., Nice 1990
(b)

ENTRY NO. CM2 Date October 9, 1995
Machine Name CYCLONE 10/5
Manufacturer ION BEAM APPLICATIONS (IBA)
Address Rue Jean Lenoir 6 - 1348 Louvain-la-Neuve, BELG
Tel 32-10-47.58.11 Telex
Fax 32-10-47.58.10 E-MAIL
In Charge: Yves JONGEN Reported by: Françoise VAMECQ

HISTORY AND STATUS

DATES: Design 1988 First Machine 1989
SALES: No. Sold/Operational 2 / 2 Currently Available Y
COST: Accelerator Facility

MAGNET

POLE PARAMETERS:

Diameter 76 cm $R_{\text{extract}} \sim 35$ cm $R_{\text{inject}} \sim 2$ cm
HILL PARAMETERS: Gap (min) 3 cm $B_{\text{max}} 1.9$ T
(@ 112.000 AT) Gap (max) cm B_{min} T
VALLEY PARAMETERS: Gap (min) 80 cm $B_{\text{max}} 0.4$ T
(@ AT) Gap (max) cm B_{min} T
AVERAGE FIELD: $\langle B \rangle_{\text{min}} 1.3$ T $\langle B \rangle_{\text{max}}$ 1.3 T
NUMBER OF SECTORS: compact/separated 4 /
sector angle 50° deg. spiral (max) 0° deg.
FIELD TRIMMING: Trim Coils None
Harmonic Coils None
Other
CURRENT: Main Coils 200 Amps Stability $5 \cdot 10^{-5}$
Trim Coils N/A Amps Stability N/A
Stored Energy (cryogenic) N/A MJ
WEIGHT: Iron 12 Tons Conductor 1.250 Tons
ION ENERGY: Bending Limit $E/A = 11$ q²/A² MeV/u
Focusing Limit $E/A = 11$ q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: 2 x 30° Dees on $\lambda/2$ Vertical Stems
No. of Gaps/turn 4 $dE/dn(\text{max}) 0.104$ MeV/q
Voltage (max) 0.03 MV Harmonic $f_H/f_{\text{ion}} 2\pi/4d$
Freq 40 MHz Power in(max) 0.010 MW
Stability: Phase Voltage $2 \cdot 10^{-3}$

VACUUM SYSTEM

OPERATING PRESSURE: $3 \cdot 10^{-6}$
PUMPS: (No. and type) 2 x 2000 l/sec ODP

ION SOURCE(S)

Type	Intensity (mA)	@	$\epsilon_n = \beta \gamma c$ (mm mrad)	Ion Species
(a) PLC	1 DC			H ⁺
(b) PLC	1 DC			d ⁺

INJECTION SYSTEM

Internal Sources Efficiency 10 %

EXTRACTION SYSTEM

Stripping Efficiency 100 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μA)	Internal	External
(a) H ⁺	10	100		100
(b) d ⁺	2.5	50		50

EXTRACTED BEAM PROPERTIES:

For μA of MeV/u ions
 $\Delta E/E$ % $\Delta\phi$ °rf
 $\epsilon_n = \beta \gamma c$ x π mm mrad z π mm mrad

REFERENCES/NOTES

(a) EPAC 1990, Y. Jongen et al., Nice 1990
(b)