ENTRY NO. CM5 Date October 9, 1995
Machine Name CYCLONE 30
Manufacturer ION BEAM APPLICATIONS (IBA)
Address Rue Jean Lenoir 6 - 1348 Louvain-la-Neuve, BEL
Tel 32-10-47.58.11 **Telex**
Fax 32-10-47.58.10 **E-MAIL**
In Charge: Yves JONGEN **Reported by:** Pascal COHILIS

HISTORY AND STATUS
DATES: Design 1985 First Machine 1986
SALES: No. Sold/Operational 16 / 16 Currently Available Y
COST: Accelerator - Facility -

MAGNET
POLE PARAMETERS:
Diameter 160 cm $R_{extract}$ 50-75 cm R_{inject} 3 cm
HILL PARAMETERS: Gap (min) 3 cm B_{max} 1.7 T
(@ 60,000 AT) Gap (max) 3 cm B_{min} T
VALLEY PARAMETERS: Gap (min) 100 cm B_{max} 0.12 T
(@ - AT) Gap (max) 100 cm B_{min} T
AVERAGE FIELD: $<B>_{min}$ 1.0 T $<B>_{max}$ 1.3 T
NUMBER OF SECTORS: compact/separated 4 /
sector angle 54-58 deg. spiral (max) 0 deg.
FIELD TRIMMING: Trim Coils None
Harmonic Coils None
Other
CURRENT: Main Coils 110 Amps Stability 5×10^{-5}
Trim Coils N/A Amps Stability N/A
Stored Energy (cryogenic) N/A MJ
WEIGHT: Iron 45 Tons Conductor 4 Tons
ION ENERGY: Bending Limit E/A = 30 q^2/A^2 MeV/u
Focusing Limit E/A = 30 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(max) 0.17 MeV/q
Voltage (max) ~0.055 MV Harmonic f_{rf}/f_{ion} 4
Freq ~66 MHz Power in(max) 0.025 MW
Stability: Phase - Voltage 10^{-3}

VACUUM SYSTEM
OPERATING PRESSURE: $2.5 \cdot 10^{-7}$
PUMPS: (No. and type) 3 x 2,000 l/sec. ODP + 2 x 1,500 l/sec (N_2) cryo's

ION SOURCE(S)

	Type	Intensity (mA)	@ $\varepsilon_n = \beta\gamma\varepsilon$ (π mm mrad)	Ion Species
(a)	Multicusp	3		H^-, d^-
(b)	Multicusp	7		

INJECTION SYSTEM
Axial Efficiency 35 %

EXTRACTION SYSTEM
Stripping Efficiency 100 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μA) Internal	External
(a) Protons (H^-)	30	500 H^-	500
(b) Protons (H^-)	30	1000 H^-	1000

EXTRACTED BEAM PROPERTIES: (a)
For 500 μA of 30 MeV/u Protons ~~ions~~
$\Delta E/E$ 1 % $\Delta\phi$ °rf
$\varepsilon_n = \beta\gamma\varepsilon$ x 10 π mm mrad z 5 π mm mrad

REFERENCES/NOTES
(a) ACC 92, Y. Jongen et al., St-Petersburg 1992
(b) EPAC 1990, Y. Jongen et al., Nice 1990

ENTRY NO. CM6 Date October 9, 1995
Machine Name CYCLONE 235
Manufacturer ION BEAM APPLICATIONS (IBA)
Address Rue Jean Lenoir 6 - 1348 Louvain-la-Neuve, BELGI
Tel 32-10-47.58.11 **Telex**
Fax 32-10-47.58.10 **E-MAIL**
In Charge: Yves JONGEN **Reported by:** Pascal COHILIS

HISTORY AND STATUS
DATES: Design 1992 First Machine 1995
SALES: No. Sold/Operational 1 / 0 Currently Available Y
COST: Accelerator - Facility -

MAGNET
POLE PARAMETERS:
Diameter 224 cm $R_{extract}$ 108 cm R_{inject} 1 cm
HILL PARAMETERS: Gap (min) 0.9 cm B_{max} 3.2 T
(@ AT) Gap (max) 9.6 cm B_{min} 1.7 T
VALLEY PARAMETERS: Gap (min) 40 cm B_{max} 1.4 T
(@ AT) Gap (max) 60 cm B_{min} 0.9 T
AVERAGE FIELD: $<B>_{min}$ > 1.7 T $<B>_{max}$ 2.15 T
NUMBER OF SECTORS: compact/separated 4 / -
sector angle 54 deg. spiral (max) 60 deg.
FIELD TRIMMING: Trim Coils -
Harmonic Coils 4
Other -
CURRENT: Main Coils 760 Amps Stability
Trim Coils - Amps Stability -
Stored Energy (cryogenic) - MJ
WEIGHT: Iron 200000 kg Conductor 10000 kg
ION ENERGY: Bending Limit E/A = 240 q^2/A^2 MeV/u
Focusing Limit E/A = 240 q/A MeV/u

ACCELERATION SYSTEM
FUNDAMENTAL ACCELERATION:
Description:
No. of Gaps/turn 4 dE/dn(max) 0.45 MeV/q
Voltage (max) 0.14 MV Harmonic f_{rf}/f_{ion} 4
Freq ~107 MHz Power in(max) 0.1 MW
Stability: Phase - Voltage $5 \cdot 10^{-4}$

VACUUM SYSTEM
OPERATING PRESSURE: $1 \cdot 10^{-5}$ mbar
PUMPS: (No. and type) Two 2000 l/s diffusion pumps

ION SOURCE(S)

	Type	Intensity (mA)	@ $\varepsilon_n = \beta\gamma\varepsilon$ (π mm mrad)	Ion Species
(a)	PIG	< 0.1		H^+
(b)				

INJECTION SYSTEM
- Efficiency - %

EXTRACTION SYSTEM
Electrostatic Efficiency %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μA) Internal	External
(a) H^+	< 240		
(b) -	-	-	-

EXTRACTED BEAM PROPERTIES:
For 300 nA ~~μA~~ of 235 MeV/u H^+ ions
$\Delta E/E$ 0.5 % expected % $\Delta\phi$ °rf
$\varepsilon_n = \beta\gamma\varepsilon$ x 3.8 π mm mrad z 1.5 π mm mrad

REFERENCES/NOTES
(a) Yves Jongen et al., EPAC 1994, London
(b)