

ENTRY NO. CM3 Date October 9, 1995
 Machine Name CYCLONE 18/9
 Manufacturer ION BEAM APPLICATIONS (IBA)
 Address Rue J. Lenoir 6 - 1348 Louvain-la-Neuve, BELGIUM
 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 01/04/90 First Machine 03/92
 SALES: No. Sold/Operational 8 / 4 Currently Available Y
 COST: Accelerator Facility

MAGNET
 POLE PARAMETERS:
 Diameter 108 cm $R_{extract}$ 48 cm R_{inject} 3 cm
 HILL PARAMETERS: Gap (min) 3 cm B_{max} 2.1 T
 (@ 112,000 AT) Gap (max) 3 cm B_{min} 2.1 T
 VALLEY PARAMETERS: Gap (min) 67 cm B_{max} 0.6 T
 (@ AT) Gap (max) 67 cm B_{min} 0.6 T
 AVERAGE FIELD: $\langle B \rangle_{min}$ 1.35 T $\langle B \rangle_{max}$ 1.35 T
 NUMBER OF SECTORS: compact/separated 4 /
 sector angle 57 deg. spiral (max) deg.
 FIELD TRIMMING: Trim Coils None
 Harmonic Coils None
 Other Iron edges (movable for deuterons)
 CURRENT: Main Coils 200 Amps Stability 10^{-4}
 Trim Coils N/A Amps Stability N/A
 Stored Energy (cryogenic) N/A MJ
 WEIGHT: Iron 20 Tons Conductor Copper 2 Tons
 ION ENERGY: Bending Limit E/A = 20 q^2/A^2 MeV/u
 Focusing Limit E/A = 20 q/A MeV/u

ACCELERATION SYSTEM
 FUNDAMENTAL ACCELERATION:
 Description: 2 x 30° Dees on lambda/4 straight stems
 No. of Gaps/turn 4 $dE/dn(max)$ 0.104 MeV/q
 Voltage (max) 0.032 MV Harmonic f_H/f_{ion} 2p/4d
 Freq 42 MHz Power in(max) 0.010 MW
 Stability: Phase Dees connected Voltage $8 \cdot 10^{-3}$

VACUUM SYSTEM
 OPERATING PRESSURE: $0 \cdot 10^{-6}$
 PUMPS: (No. and type) 4 x 700 l/sec ODP

ION SOURCE(S)		Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a)	PIG	1 DC			H ⁻
(b)	PIG	1 DC			d ⁻

INJECTION SYSTEM
 2 internal sources Efficiency 10 %

EXTRACTION SYSTEM
 Carbon Stripper Efficiency 100 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μ A)	
		Internal	External
(a) H ⁻	18	100	100
(b) d ⁻	4.5	> 35	> 35

EXTRACTED BEAM PROPERTIES:
 For μ A of MeV/u ions
 $\Delta E/E$ % $\Delta\phi$ *rf
 $\epsilon_n = \beta\gamma\epsilon$ x π mm mrad z π mm mrad

REFERENCES/NOTES
 (a) EPAC 1990, Y. Jongen, Nice, 1990
 (b)

ENTRY NO. CM4 Date October 9, 1995
 Machine Name CYCLONE 18+
 Manufacturer ION BEAM APPLICATIONS (IBA)
 Address Rue J. Lenoir 6 - 1348 Louvain-la-Neuve, BELGIUM
 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 1991 First Machine 1992
 SALES: No. Sold/Operational 4 / 2 Currently Available Y
 COST: Accelerator Facility

MAGNET
 POLE PARAMETERS:
 Diameter 108 cm $R_{extract}$ 48 cm R_{inject} 1 cm
 HILL PARAMETERS: Gap (min) 3 cm B_{max} 2.0 T
 (@ AT) Gap (max) 3 cm B_{min} 1.4 T
 VALLEY PARAMETERS: Gap (min) 60 cm B_{max} 0.9 T
 (@ AT) Gap (max) 60 cm B_{min} 0.3 T
 AVERAGE FIELD: $\langle B \rangle_{min}$ 1.3 T $\langle B \rangle_{max}$ 1.37 T
 NUMBER OF SECTORS: compact/separated 4 /
 sector angle 58 deg. spiral (max) deg.
 FIELD TRIMMING: Trim Coils
 Harmonic Coils
 Other
 CURRENT: Main Coils 185 Amps Stability
 Trim Coils Amps Stability
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 34000 kg Conductor 2000 kg
 ION ENERGY: Bending Limit E/A = 19 q^2/A^2 MeV/u
 Focusing Limit E/A = 19 q/A MeV/u

ACCELERATION SYSTEM
 FUNDAMENTAL ACCELERATION:
 Description: RF Cavities in Opposite Valleys
 No. of Gaps/turn 4 $dE/dn(max)$ 0.17 MeV/q
 Voltage (max) 0.05 MV Harmonic f_H/f_{ion} 4
 Freq 42 MHz Power in(max) 0.035 MW
 Stability: Phase Voltage $5 \cdot 10^{-3}$

VACUUM SYSTEM
 OPERATING PRESSURE: $2 \cdot 10^{-5}$ mbar
 PUMPS: (No. and type) Two 700 l/s diffusion pumps

ION SOURCE(S)		Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a)	PIG	> 2			H ⁺
(b)					

INJECTION SYSTEM
 Efficiency %

EXTRACTION SYSTEM
 Efficiency %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μ A)	
		Internal	External
(a) H ⁺	< 18	2000	
(b)			

EXTRACTED BEAM PROPERTIES:
 For μ A of MeV/u ions
 $\Delta E/E$ % $\Delta\phi$ *rf
 $\epsilon_n = \beta\gamma\epsilon$ x π mm mrad z π mm mrad

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

NB : INTERNAL TARGETS
 DEES CONNECTED AT THE CENTRE