

ENTRY NO. C22 Date July 92
 Name of Machine Karlsruhe Isochronous Cyclotron (KIZ)
 Institution Kernforschungszentrum Karlsruhe GmbH, Cyclotron-Laboratory
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HISTORY
 MILESTONE DATES:
 Design 1958 Model Tests 1958-60
 Construction 1960-62 First Beam
 DESIGN/CONSTRUCTION BY:
 in house other AEG
 COST: Accelerator 4.6 x 10⁶ DM Facility 20 x 10⁶ DM
 FUNDED BY: Federal Government, State of Baden-Württemberg

STATUS
 STAFF: Machine
 Scientists 2 Engineers 2
 Technicians 10 Students 4
 Research (in house/external)
 Scientists 20 / 40 Engineers 10 / 20
 Technicians 10 / 20 Students 5 / 10
 BUDGET: Machine 2 x 10⁶ DM Funded by Government
 Research 2 x 10⁶ DM Funded by Government
 TIME DISTRIBUTION:
 Basic Research (in house/external) 50 % / 50 %
 Applied Program (in house/external) 80 % / 20 %
 Development 5 % Maintenance 3 %

MAGNET
 POLE PARAMETERS:
 Diameter 225 cm R_{extract} 105 cm R_{inject} 10 cm
 HILL PARAMETERS: Gap (min) 8 cm B_{max} 1.95 T
 (Ø 0.16 x 10⁶ AT) Gap (max) cm B_{min} T
 VALLEY PARAMETERS: Gap (min) 16 cm B_{max} 0.95 T
 (Ø 0.16 x 10⁶ AT) Gap (max) cm B_{min} T
 AVERAGE FIELD: < B >_{xxx} 1.43 T < B >_{max} T
 NUMBER OF SECTORS: compact/separated 3 /
 sector angle deg. spiral (max) deg.
 FIELD TRIMMING: Trim Coils 6 on hill sectors
 Harmonic Coils 6 on hill sectors
 Other
 CURRENT: Main Coils 360 Amps Stability 10⁻⁶
 Trim Coils 10 Amps Stability 10⁻³
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 280 tons Conductor 8.5 tons
 ION ENERGY: Bending Limit E/A = 104 q²/A² MeV/u
 Focussing Limit E/A = 26 q/A MeV/u

ACCELERATION SYSTEM
 FUNDAMENTAL ACCELERATION:
 Description: Self excited system, 3 DEES
 No. of Gaps/turn 6 dE/dn(max) 0.24 MeV/q
 Voltage(max) 0.05 MV Harmonic f_{rf}/f_{ion} 3
 Freq 33 MHz Power in(max) 0.05 MW
 Stability: Phase ± 1 deg Voltage 10³
 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: 2 x 10⁻⁶ torr
 PUMPS: No. and type 2 diffusions pumps, 2 x 12.000 l/sec

ION SOURCE(S)

Type	Intensity (mA)	ϕ (πmm mrad)	ε _n = βγε (πmm mrad)	Ion Species
(a) Hot cathode penning	0.5			H ₂ ⁺ , d, ⁴ He ²⁺
(b) ECR-source	0.1			⁶ Li ³⁺ , ³ He ²⁺
(c) Atomic beam	0.02			d
(d)				

INJECTION SYSTEM
 Electrostatic, Hyperboloid Infl. Efficiency 20 %

EXTRACTION SYSTEM
 Electrostatic Efficiency 70-80 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)	
		Internal	External
(a) H ₂ ⁺ , d	26	300	50
(b) He ²⁺	26	100	20
(c) Li-6	26	1	0.5
(d) pol. d	26	2	1

Secondary Particles	E (MeV)	part/sec
(a)		
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:
 For 1 μA of d ions
 ΔE/E 0.1 % Δφ 5-10 ° of
 ε_n = βγε x 8 πmm mrad z 4 πmm mrad

FACILITIES FOR RESEARCH
 SHIELDED AREA: Fixed 350 m² Moveable m²
 Target Stations: 8 No. Served At Same Time: 1
 MAGNETIC SPECTROMETERS: Little John K=300
 OTHER FACILITIES:
 Neutron Hall with POLKA
 Dual Beam Facility

REFERENCES/NOTES
 (a) Proc. 7th Int. Conf. on cyclotrons, p. 496
 (b) Prof. 12th Int. Conf. on cyclotrons, p. 194

PLAN VIEW OF FACILITY, COMMENTS

