

ENTRY NO. C9 Date
 Name of Machine INR Cyclotron
 Institution Institute of Nuclear Research, Academia Sinica, Shanghai
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 In Charge: Lin-xing Chen Reported by: Gen-xiang Gu

HISTORY
 MILESTONE DATES:
 Design 1978-1979 Model Tests
 Construction 1980-1982 First Beam Nov. 1983
 DESIGN/CONSTRUCTION BY:
 in house other Facility
 COST: Accelerator Facility
 FUNDED BY: Academia Sinica

STATUS
 STAFF: Machine
 Scientists Engineers
 Technicians Students
 Research (in house/external)
 Scientists / Engineers /
 Technicians / Students /
 BUDGET: Machine Funded by
 Research Funded by
 TIME DISTRIBUTION:
 Basic Research (in house/external) 30 % / %
 Applied Program (in house/external) 60 % / %
 Development % Maintenance 10 %

MAGNET
 POLE PARAMETERS:
 Diameter 138 cm R_{extract} 61 cm R_{inject} cm
 HILL PARAMETERS: Gap (min) 14.6 cm B_{max} 17.5 T
 (ϕ AT) Gap (max) cm B_{min} T
 VALLEY PARAMETERS: Gap (min) 22.4 cm B_{max} 11.7 T
 (ϕ AT) Gap (max) cm B_{min} T
 AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ 14.6 T $\langle B \rangle_{\text{max}}$ T
 NUMBER OF SECTORS: compact/separated 2 /
 sector angle deg. spiral (max) deg.
 FIELD TRIMMING: Trim Coils 9
 Harmonic Coils 3
 Other
 CURRENT: Main Coils 450 Amps Stability 5×10^{-5}
 Trim Coils 400 Amps Stability 1×10^{-4}
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 120 tons Conductor
 ION ENERGY: Bending Limit $E/A =$ 32 q²/A² MeV/u
 Focussing Limit $E/A =$ 30 q/A MeV/u

ACCELERATION SYSTEM
 FUNDAMENTAL ACCELERATION:
 Description: 1x180 Dees
 No. of Gaps/turn 2 $dE/dn(\text{max})$ 0.140 MeV/q
 Voltage(max) 0.07 MV Harmonic $f_{\text{rf}}/f_{\text{ion}}$
 Freq 10-22 MHz Power in(max) 0.100 MW
 Stability: Phase Voltage
 OTHER CAVITIES (Flattopping or otherwise):
 Description:
 Region of Influence: R_{min} cm R_{max} cm
 No. of Gaps/turn $dE/dn(\text{max})$ MeV/q
 Voltage(max) MV Harmonic $f_{\text{rf}}/f_{\text{ion}}$
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM
 OPERATING PRESSURE: 1.5×10^{-5} torr
 PUMPS: No. and type 2x1250 l/s oil diff.

ION SOURCE(S)
 Type Intensity ϕ $\epsilon_n = \beta \gamma \epsilon$ Ion Species
 (mA) (π mm mrad)
 (a) P.I.G type D, alpha, d
 (b)
 (c)
 (d)

INJECTION SYSTEM
 Efficiency %
EXTRACTION SYSTEM 2 sections of electrostatic
 defl. + Foc. Mag. Channel + Mag. Efficiency %
 Weak. Channel

CHARACTERISTIC BEAMS
 Accelerated Ions E/A (MeV/u) Current (part μ A)
 Internal External
 (a) P 10-30 30
 (b) d 20-16 60
 (c) alpha 32-40 15
 (d)
 Secondary Particles E (MeV) part/sec
 (a)
 (b)
 (c)

EXTRACTED BEAM PROPERTIES:
 For μ A of 15-30 MeV/u P ions
 $\Delta E/E$ 0.43-0.7 % $\Delta \phi$ °rf
 $\epsilon_n = \beta \gamma \epsilon$ x π mm mrad z π mm mrad

FACILITIES FOR RESEARCH
 SHIELDED AREA: Fixed m² Moveable m²
 Target Stations: No. Served At Same Time:
 MAGNETIC SPECTROMETERS:
 OTHER FACILITIES:

REFERENCES/NOTES

(a)
 (b)

PLAN VIEW OF FACILITY, COMMENTS

