

ENTRY NO. CU27 Date June 22nd, 1992
 Name of Machine MC 32 NI
 Institution German Cancer Research Center/Deutsches Krebsforschungszentrum Heidelberg, DKFZ
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HISTORY
 MILESTONE DATES:
 Design 1989/90 Model Tests 1991-92
 Construction 1989-91 First Beam April 1991
 DESIGN/CONSTRUCTION BY:
 in house other SCANDITRONIX AB
 COST: Accelerator 5MDM(3.2M\$) Facility
 FUNDED BY: DKFZ

STATUS
 STAFF: Machine
 Scientists 1 Engineers 1
 Technicians 3 Students
 Research (in house/external)
 Scientists 5 / 2 Engineers * /
 Technicians 4 / 3 Students * /
 BUDGET: Machine 100 K\$ Funded by DKFZ
 Research 200 K\$ Funded by DKFZ+others
 TIME DISTRIBUTION:
 Basic Research (in house/external) 50 % / * %
 Applied Program (in house/external) 50 % / * %
 Development % Maintenance %

MAGNET
 POLE PARAMETERS:
 Diameter 135 cm R_{extract} 48.6 cm R_{inject} cm
 HILL PARAMETERS: Gap (min) 10 cm B_{max} 1.95 T
 (0 AT) Gap (max) 18 cm B_{min}
 VALLEY PARAMETERS: Gap (min) 18 cm B_{max} T
 (0 AT) Gap (max) 18 cm B_{min} T
 AVERAGE FIELD: < B >_{min} 1.615 T < B >_{max} 1.655 T
 NUMBER OF SECTORS: compact/separated 4 / 5
 sector angle 40 deg. spiral (max) 75 deg.
 FIELD TRIMMING: Trim Coils 3
 Harmonic Coils 2
 Other
 CURRENT: Main Coils 520 Amps Stability 1x10⁻⁵
 Trim Coils 5/10/15 Amps Stability
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 53.000 kg Conductor 3.025 kg
 ION ENERGY: Focusing Limit E/A = 34 q²/A² MeV/u
 Focussing Limit E/A = q/A MeV/u

ACCELERATION SYSTEM
 FUNDAMENTAL ACCELERATION:
 Description: 2 master oscillators + power amplif.
 No. of Gaps/turn 2 dE/dn(max) 0.06 MeV/q
 Voltage(max) 0.03 MV Harmonic f_{rf}/f_{ion}
 Freq 24.3 MHz Power in(max) 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(max) MeV/q
 Voltage(max) MV Harmonic f_{rf}/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM
 OPERATING PRESSURE: 2x10⁻⁷ mbar
 PUMPS: No. and type 2 oil diff. p. 4000 l/sec
 1 roots p. 250 cbm/h, 1 backing p. 30 cbm/h

ION SOURCE(S)
 Type Intensity (mA) $\epsilon_n = \beta\gamma\epsilon$ (mm mrad) Ion Species
 (a) dual cold 1300 max. H⁻ / D⁻
 (b) cathode
 (c)
 (d)

INJECTION SYSTEM
 Efficiency %

EXTRACTION SYSTEM
 stripper foil Efficiency ≥ 95 %

CHARACTERISTIC BEAMS
 Accelerated Ions E/A (MeV/u) Current(part μ A)
 Internal External
 (a) H⁻ 32 60 (guar.)
 (b) D⁻ 7.5 60
 (c)
 (d)
 Secondary Particles E (MeV) part/sec
 (a) n (p \rightarrow Be.) $\bar{E}_n \sim 14$
 (b)
 (c)

EXTRACTED BEAM PROPERTIES:
 For 1 μ A of 32 MeV/u H⁻ ions
 $\Delta E/E$ % $\Delta\phi$ °rf
 $\epsilon_n = \beta\gamma\epsilon$ x 9 π mm mrad z 8 π mm mrad

FACILITIES FOR RESEARCH
 SHIELDED AREA: Fixed 18x20 m² Moveable m²
 Target Stations: max 9 No. Served At Same Time: 1
MAGNETIC SPECTROMETERS:
 OTHER FACILITIES:
 targets for radionuclide production
 Be-targets for fast neutron production
 (scheduled for Oct. 1993)

REFERENCES/NOTES
 (a)
 (b)

PLAN VIEW OF FACILITY, COMMENTS
 The MC 32 NI is able to accelerate H⁻ as well as D⁻ ions.
 Acceptance test is scheduled for Sept. 92
 Routine operation has not started yet.

* will be cleared up in 1 to 2 years