

ENTRY No. 26

NAME OF MACHINE HAIZY DATE July 1981
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HISTORY AND STATUS

DESIGN, date 1965 Model tests 1966
 ENG DESIGN, date 1966
 CONSTRUCTION, date 1966-1968
 FIRST BEAM, date (or goal) 1968
 MAJOR ALTERATIONS Extractor, ion source, vacuum system, stabilization of electric supplies
 COST, ACCELERATOR 5 Million DM
 COST, FACILITY, total 10 Million DM
 FUNDED BY BMFT (Fed. Gov.) and State of Hamburg

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 5 a 30% ENGINEERS 3
 TECHNICIANS 6 CRAFTS 4
 GRAD STUDENTS involved during year 5
 OPERATED BY Research staff or Operators
 OPERATION 150 hr/wk, On target 120 hr/wk
 TIME DISTR. in house 90% Outside 10%
 BUDGET, op & dev 300,000 - DM
 FUNDED BY BMFT (Fed. Gov.) and State of Hamburg

RESEARCH STAFF, not included above

USERS, in house 15 outside 4-10
 GRAD STUDENTS involved during year 20-30
 RESEARCH BUDGET, in house 500,000 - DM
 FUNDED BY BMFT (Fed. Gov.) and State of Hamburg

MAGNET

POLE FACE, diameter (compact) 140 cm, R extraction 56 cm
 R injection 0:0 cm
 GAP, min 16 cm, Field 20 kG
 max 32 cm, Field 10 kG } at $0.4 \cdot 10^6$
 AVERAGE FIELD at R ext 15 kG } Ampere turns
 B max/ 1.33

NUMBER OF SECTORS { compact 3 } Spiral, max 37 deg
 separated }
 SECTOR ANGLE (SSC) 60 deg
 TRIMMING COILS 10 Circular per pole face plus
 3 harmonic per valley

CONDUCTOR, material and type Main coil: Al; Trim.coils:Cu
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 140 max, kW; current stability $2 \cdot 10^{-6}$
 trimming coils 40 max, kW; current stability 10^{-5}
 WEIGHT: Fe 80 tons; coils 8 tons
 COOLING system Closed circuit + heat exchanger (H₂O)
 ION ENERGY (bending limit) E/A = 33 q²/a² MeV/amu
 (focusing limit) E/A = 30 q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 1; angle 180 deg
 BEAM APERTURE 2.8 cm; DC Bias 1 kV
 TUNED by, coarse Mov, short fine Var. capacitor
 RF 5 to 23 MHz, stable $\pm 2 \cdot 10^{-5}$
 Orb F 5 to 23 MHz
 HARMONICS, RF/Orb F, used -
 DEE - Gnd, max 50 kV, min gap 2 cm
 STABILITY, (pk-pk noise)/(pk RF volt) 10^{-3}
 ENERGY GAIN, max 100 kV/turn
 RF PHASE, stable to ± 3 deg
 RF POWER input, max 100 kW
 FREQUENCY MODULATION, rate - /s
 modulator, type -
 beam pulse, width -

VACUUM SYSTEM

OPERATING PRESSURE $2 \cdot 10^{-6}$ Torr or mbar
 PUMPS, No, Type, Size 2 Forepumps: ALCATEL 2060 (60 m³/h),
 LEYBOLD VA 250 (250 m³/h); 1 Diff. Pump: LEYBOLD Di
 12000 (12000 l/s); Liq. N₂-Trap.

ION SOURCES Livingston type; Cu-chimney; Mo-aperture;
 Hf-carbide cathode

INJECTION SYSTEM

EXTRACTION SYSTEM

Electrostat Deflector plus 2 Magnetic Channels

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed - m²; movable 600 m²
 TARGET STATIONS 8 in 3 rooms
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type -
 COMPUTER model PDP 11/40
 OTHER FACILITIES n-TOF-system with ext. pulsing (these proceedings); high energy proton microprobe (these proceedings); activation station; analysed beam station

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (µA)	
	Goal	Achieved	Internal	External
p	3-33	6-30	>100	> 20
d	5-16	5-17	>100	> 20
T	13-44	15-44	6	3
α	10-32	10-32	6	3

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 30 RF deg 10 µA of 15 MeV p. ions
 PHASE EXC, max 3 RF deg 5 µA of 20 MeV p. ions
 EXTRACT eff 60% 10 µA of 20 MeV p. ions
 RESOL ΔE/E 0.3% 5 µA of 15 MeV p. ions
 EMITTANCE

(π mm. mrad) { 10 axial } 2 µA of 25 MeV p. ions
 { 10 rad }

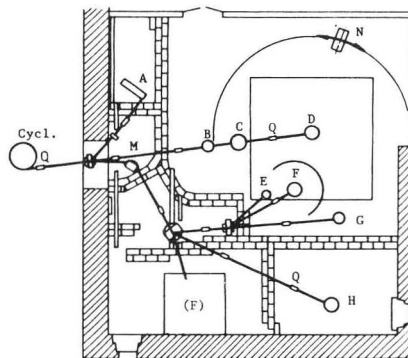
OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 65% SOLID STATES PHYSICS 5%
 BIOMEDICAL APPLICAT. 5% ISOTOPE PRODUCTIONS 5%
 Wear-research 5%; Machine research 15% (Quality of internal beam, extraction, beam transport)

REFERENCES/NOTES

Nucl. Instr. & Meth. 18,19(1962)88
 CERN Rep. 63-19 (SFC-Conf.)43,214,228 (1963)
 Annual reports and internal reports (available on request)

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS



- A: Isotope-prod.
- B: Microprobe
- C: Few nucl. corr. exp.
- D: n-TOF-exp.
- E: Sol. state exp.
- F: Fission exp.
- G: Pol. ³He-exp.
- H: Scattering chamber exp.
- Q: Quadrupoles
- M: Anal. magnet
- N: n-detectors