

ENTRY No. 24

NAME OF MACHINE CV 28 DATE September 1974
 INSTITUTION Physikalisch-Technische Bundesanstalt
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 IN CHARGE H.J. Brede REPORTED BY H.J. Brede

HISTORY AND STATUS

DESIGN, date 1969 Model tests 1972
 ENG DESIGN, date 1970
 CONSTRUCTION, date 1972 - 1974
 FIRST BEAM, date (or goal) 1973
 MAJOR ALTERATIONS New Pumping System, New Deflector, RF-Modulator Power Amplifier
 COST, ACCELERATOR $1.5 \cdot 10^6$ \$
 COST, FACILITY, total $10 \cdot 10^6$ \$
 FUNDED BY Federal Republic of Germany

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 1
 TECHNICIANS 2 CRAFTS 1
 GRAD STUDENTS involved during year none
 OPERATED BY Research staff or X Operators
 OPERATION 2Q hr/wk, On target 20 hr/wk
 TIME DISTR. in house 10Q %, Outside %
 BUDGET, op & dev $4 \cdot 10^4$ \$
 FUNDED BY Government

RESEARCH STAFF, not included above

USERS, in house 10 outside
 GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house $2 \cdot 10^5$ \$
 FUNDED BY Government

MAGNET

POLE FACE, diameter (compact) 96.5cm, R extraction 4.2 cm
 R injection cm
 GAP, min 5.08 cm, Field 14 kg }
 max 11.64 cm, Field 21 kg } at $2.2 \cdot 10^5$
 AVERAGE FIELD at R ext 17.4 kg } Ampere turns
 B max/ < B >

NUMBER OF SECTORS { compact 3 } Spiral, max 60deg
 { separated }
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS

CONDUCTOR, material and type
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 60 max, kW; current stability 10^{-5}
 trimming coils 6 max, kW; current stability 10^{-5}
 WEIGHT: Fe 2Q tons; coils 2 tons
 COOLING system
 ION ENERGY (bending limit) E/A = 28 q²/a² MeV/amu
 (focusing limit) E/A = 28 q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2; angle 90 deg
 BEAM APERTURE 3 cm; DC Bias 0.4 kV
 TUNED by, coarse MSP, fine VC
 RF 6.5 to 26.2 MHz, stable $\pm 10^{-5}$
 Orb F 6.5 to 26.2 MHz
 HARMONICS, RF/Orb F, used Fundamental
 DEE - Gnd, max 35 kV, min gap cm
 STABILITY, (pk-pk noise)/(pk RF volt) $5 \cdot 10^{-4}$
 ENERGY GAIN, max 120 kV/turn
 RF PHASE, stable to ± 3 deg
 RF POWER input, max 75 kW
 FREQUENCY MODULATION, rate /s
 modulator, type Internal Pulsing System
 beam pulse, width < 1 ns (fwhm)

VACUUM SYSTEM

OPERATING PRESSURE $2 \cdot 10^{-5}$ Torr or mbar
 PUMPS, No, Type, Size 2 Turbomolecular and 1
 Cryo. -Pumps

ION SOURCES

"Cold Cathode" Penning or Thermionic Mode

MSP - Movable Shorting Plane
 VC - Variable Capacitor

INJECTION SYSTEM

EXTRACTION SYSTEM

DC electrostatic with magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 625 m²; movable m²
 TARGET STATIONS 5 in 2 rooms
 STATIONS served at same time, max
 MAG SPECTROGRAPH, type PDP 11/45
 COMPUTER model
 OTHER FACILITIES
 Time of Flight Facility for Fast Neutrons

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pA)	
	Goal	Achieved	Internal	External
D ⁺	2 - 24	2 - 24	> 350	100 - 70
³ He ⁺⁺	3 - 14	2 - 14	> 300	100
⁴ He ⁺⁺	5 - 36	4 - 36	> 150	15 - 50
He	6 - 28	4 - 28	> 150	10 - 50

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 6 RF deg 1 pA of 10 MeV p ions
 PHASE EXC, max RF deg 1 pA of 10 MeV d ions
 EXTRACT eff 70 % pA of MeV ions
 RESOL $\Delta E/E$ 0.3 % pA of MeV ions
 EMITTANCE
 (π mm. mrad) { 7 axial } 10 pA of 10 MeV d ions
 { 10 rad }

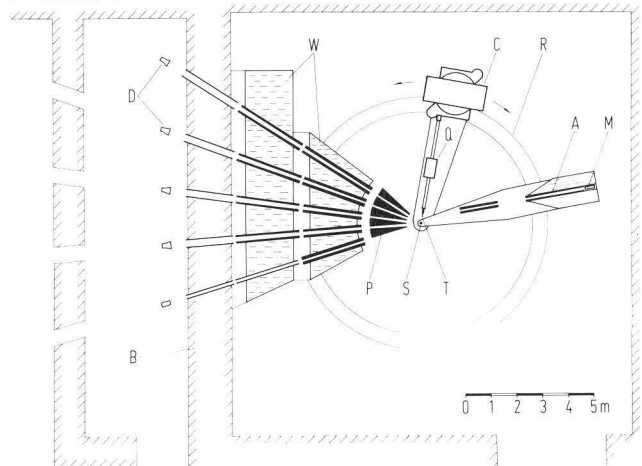
OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS .. SOLID STATES PHYSICS ..
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS
 Neutron Production for Scattering Experiments

REFERENCES/NOTES

PTB-Bericht ND-11, Oktober 1977
 Nucl. Instr. and Meth., 169 (1980) 349-358

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS



Layout of the neutron scattering experiment:
 A, collimating shield; B, concrete shield; C, cyclotron; D, neutron detector; M, neutron monitor; P, polyethylene shields; Q, quadrupole magnet; R, rails; S, scattering probe (pivot of cyclotron movement); W, water tank; T, neutron producing target.