

ENTRY NO. 27

NAME OF MACHINE CV 28
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 IN CHARGE R. Böttger REPORTED BY R. Böttger

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, New Main Magnet Coils
 COST, ACCELERATOR $3 \cdot 10^6$ DM and Power Supply
 COST, FACILITY, total $25 \cdot 10^6$ DM
 FUNDED BY Federal Republic of Germany

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 1
 TECHNICIANS 3 CRAFTS /
 GRAD STUDENTS involved during year /
 OPERATED BY Research staff or X Operators
 OPERATION 20 hr/wk. On target 20 hr/wk
 TIME DISTR. in house 100 % Outside %
 BUDGET, op & dev
 FUNDED BY

RESEARCH STAFF, not included above

USERS, in house 12 outside 5
 GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house
 FUNDED BY

MAGNET

POLE FACE, diameter (compact) 96.5 cm, R extraction 42 cm
 R injection cm
 GAP, min 5.08 cm, Field 14 kG
 min 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 deg
 { separated }
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS

CONDUCTOR, material and type
 STORED ENERGY (cryogenic) MJ
 POWER: main coils .85 max, kW; current stability 10^{-6}
 trimming coils .6 max, kW; current stability 10^{-5}
 WEIGHT: Fe .20 tons; coils .2 tons
 COOLING system Distilled Water
 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 .4 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 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 225 m²; movable / m²
 TARGET STATIONS 5 in 2 rooms
 STATIONS served at same time, max
 MAG SPECTROGRAPH, type
 COMPUTER model 2 PDP 11/34; 2 ISI 11/23
 OTHER FACILITIES Time of Flight Facility for Fast Neutrons;
 Standard Neutron Field for Therapy and Radiobiology

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (μ A)	
	Goal	Achieved	Internal	External
p	2 - 24	1.5 - 24	> .350	100 - 70
d	3 - 14	2 - 14	> .300	100
³ He	5 - 36	4 - 36	> .150	15 - 50
⁴ He	6 - 28	4 - 28	> .150	10 - 50

SECONDARY (part/s)

BEAM PROPERTIES

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

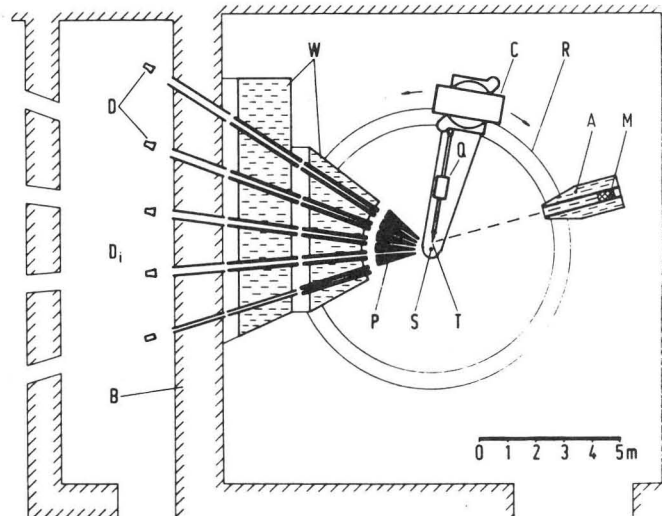
OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT ISOTOPE PRODUCTIONS
 Neutron Production for Scattering Experiments
 Dosimetry for Fast Neutrons

REFERENCES/NOTES

- 1) Nucl. Instr. Meth., 169 (1980) 349 - 358
- 2) IAEA-AG-371/14, 203 - 215

PLAN VIEW OF FACILITY, COMMENTS



- 1.) R. Böttger et al, "A Multi-Angle Time-of-Flight Spectrometer for Fast Neutron Scattering Experiments", Proc. on Nuclear Data for Science and Technology, Antwerp, Belgium, 1982, Reidel, Dordrecht (1983), 836 - 839
- 2.) Nucl. Instr. Meth., 193 (1982) 635 - 644