

ENTRY NO. 26 Bonn Isochronous Cyclotron
 NAME OF MACHINE University of Bonn, Institut für Strahlen- und Kernphysik
 INSTITUTION Nussallee 14-16, D-5300 Bonn 1, Germany
 ADDRESS TEL. 0228- 73 2201 TELEX
 IN CHARGE T. Mayer-Kuckuk REPORTED BY K. Euler, H. Wahl

HISTORY AND STATUS

DESIGN, date 1965 Model tests 1966-67
 ENG DESIGN, date 1966-67
 CONSTRUCTION, date 1967-69
 FIRST BEAM, date (or goal) Dec. 1968
 MAJOR ALTERATIONS none

COST, ACCELERATOR 5×10^6 DM
 COST, FACILITY, total 8×10^6 DM

FUNDED BY Bundesminister fuer Forschung & Technologie
 ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 3 ENGINEERS 3
 TECHNICIANS 5 CRAFTS 1

GRAD STUDENTS involved during year 1986 6
 OPERATED BY Research staff or 5 Operators

OPERATION 120 hr/wk. On target 100 hr/wk
 TIME DISTR. in house 90 % outside 10 %

BUDGET, op & dev 1.3×10^6 DM
 FUNDED BY Land Nordrhein-Westfalen

RESEARCH STAFF, not included above
 USERS, in house 75 outside 7

GRAD STUDENTS involved during year 1986 30
 RESEARCH BUDGET, in house 4.5×10^5 DM

FUNDED BY Land NRW and Bundesminister fuer
 MAGNET Forschung & Technologie

POLE FACE, diameter (compact) 200 cm, R-extraction 92 cm
 R injection cm

GAP, min 8.4 cm, Field 18.5 kG
 max 24 cm, Field 7 kG at $0.14 \cdot 10^6$

AVERAGE FIELD at R ext 12.7 kG Ampere turns
 B max / < B > 1.46

NUMBER OF SECTORS { compact 3 } Spiral, max 0 deg
 { separated }

SECTOR ANGLE (SSC) deg
 TRIMMING COILS 7/sector

CONDUCTOR, material and type copper
 STORED ENERGY (cryogenic) MJ

POWER: main coils 40 max kW: current stability 25×10^{-6}
 trimming coils 8 max kW: current stability 25×10^{-6}

WEIGHT: Fe 200 tons coils 5 tons
 COOLING system demineralized water

ION ENERGY (Bending limit) E/A = 60 q^2/A^2 MeV/amu
 (Focusing limit) E/A = 30 q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 3 angle 40 deg
 BEAM APERTURE 2,4 cm; DC Bias 0 kV

TUNED by, coarse capacity fine loops
 RF 20 to 29 MHz, stable $\pm 10^{-5}$

Orb F 6,67 to 9,67 MHz
 HARMONICS, RF/Orb F, used 3(9)

DEE-Gnd, max 45 kV, min gap 2,3 cm
 STABILITY, (pk-pk noise)/(pk RF volt) 10^{-4}

ENERGY GAIN, max 200 kV/turn
 RF PHASE, stable to ± 2 deg

RF POWER input, max 30 kW
 FREQUENCY MODULATION, rate /s

modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 2×10^{-6} Torr or mbar
 PUMPS, No, Type, Size diffusion pump

ION SOURCES

Penning IS, Atomic Beam IS for polarized p; d *

INJECTION SYSTEM

Axial Hyperboloidinflexor

EXTRACTION SYSTEM

Electrostatic Deflector 2 magn. channels

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 415 m²; movable m²

TARGET STATIONS 12 in 4 rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type split pole

COMPUTER model VAX 11 T 750

OTHER FACILITIES Orange Spectrometer

Off-Line Mass Separator

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (μ A)	
	Goal	Achieved	Internal	External
d	14-28	14-18	20	15
	28-56	28-56	20	15
12 C	85	45	1	0.7
14 N	100	110	1	0.7
SECONDARY			(part/s)	

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 5 RF deg 1 μ A of 25 MeV d ions
 PHASE EXC, max RF deg μ A of MeV ions
 EXTRACT eff. 90 % 25 μ A of 28 MeV d ions
 RESOL $\Delta E/E$ 0,1 % 5 μ A of 25 MeV d ions
 EMITTANCE

≤ 10 axial 10 μ A of 25 MeV d
 (π mm-mrad) ≤ 10 rad

OPERATING PROGRAMS, time distribution %

BASIC NUCLEAR PHYSICS 75 SOLID STATES PHYSICS 5
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS 10

Archaeometric applications 2
 Development 8

REFERENCES/NOTES

- IEEE Trans. Nucl. Sci. NS26-2(1979)p.2156
- Nucl. Instr. 130 (1975) 335

PLAN VIEW OF FACILITY, COMMENTS, ETC.

* The Penning Ion Source will be replaced in late 1986 by an Electron-Cyclotron-Resonance Ion-Source.