ENTRY NO. 23

NAME OF MACHINE Bonn Isochronous Cyclotron; DATE March 84

INSTITUTION Institut für Strahlen- und Kernphysik der Universität Bonn

ADDRESS Nussallee 14-16, D 5300 Bonn 1, Germany

TEL 0228/732201 TELEX

IN CHARGE T. Mayer-Kuckuk REPORTED BY 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. 68

MAJOR ALTERATIONS None

COST, ACCELERATOR 5,000,000 DM

COST, FACILITY, total 8,000,000 DM

FUNDED BY Bundesminister für Bildung u.Wissensch.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 2 ENGINEERS 3

TECHNICIANS 5 CRAFTS 1

GRAD STUDENTS involved during year 15

OPERATED BY Research staff or 5 Operators

OPERATION 140 hr/wk. On target 120 hr./wk

TIME DISTR. in house 98 % Outside 2 %

BUDGET, op & dev 1,400,000 DM

FUNDED BY Land NRW

RESEARCH STAFF, not included above

USERS, in house ~ 60 outside ~ 10

GRAD STUDENTS involved during year ~ 20

RESEARCH BUDGET, in house 400,000 DM

FUNDED BY Land NRW u. Bundesmin. f. Forsch. u. Technol.

MAGNET

POLE FACE, diameter (compact) 200 cm, R extraction 91 cm

R injection 38 cm

GAP, min 8,4 cm, Field 18,5 kG
min 24 cm, Field 7,0 kG } at 0,14·10^6 Ampere turns

AVERAGE FIELD at R ext 12,7 kG

B max/ < B > 1,46

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

SECTOR ANGLE (SSC) --- deg

TRIMMING COILS 6 x 7

CONDUCTOR, material and type copper

STORED ENERGY (cryogenic) 0,3 MJ

POWER: main coils 40 max, kW; current stability 10^{-5}

trimming coils 5 max, kW; current stability 10^{-5}

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 = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 3 ; angle 40 deg

BEAM APERTURE 2,4 cm; DC Bias 0 kV

TUNED by, coarse panels fine rot. loops

RF 20,1 to 28,5 mHz, stable ± 10^{-5}

Orb F 6,7 to 9,5 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) $5 \cdot 10^{-4}$

ENERGY GAIN, max 200 kV/turn

RF PHASE, stable to ± < 3 deg

RF POWEP input, max 40 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 1, oil-diffusion, 60 cm, 12.000 l/s

ION SOURCES

Penning Ionization Gauge + polarized I.S.

INJECTION SYSTEM

axial

EXTRACTION SYSTEM

electrostat. deflector, screen chann., foc. chann.

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 415 m²; movable -- m²

TARGET STATIONS 13 in 4 rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type split pole (Scanditronix)

COMPUTER model PDP9, PDP15, XVM200, 2xVAX 11/750

OTHER FACILITIES isotope production + chem., Orange-Spectr., time-of-flight-study, off-line mass separation

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
d		14-30	50	30
α		28-60	20:2	16:2
$^{12}C^{4+}$		84	0,8:4	0.4:4
$^{14}N^{5+}$		98	0,8:5	0.4:5
SECONDARY		(part/s)		

BEAM PROPERTIES

MEASURED		CONDITIONS				
PULSE WIDTH	~ 5 RF deg	~ 1	pμ A of 28	MeV	d	ions
PHASE EXC. max	RF deg		pμ A of	MeV		ions
EXTRACT eff	90 %	25	pμ A of 28	MeV	d	ions
RESOL ΔE/E	0,1 %	5	pμ A of 25	MeV	d	ions
EMITTANCE (π mm. mrad)	≤ 10 axial, ≤ 10 rad	10	pμ A of 14-30	MeV	d	ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 67% SOLID STATES PHYSICS 20%

BIOMEDICAL APPLICAT. -- ISOTOPE PRODUCTIONS 5%

archeometric appl. 2%

development 6%

REFERENCES/NOTES

1) T. Mayer-Kuckuk: IEEE NS 13, (1966) 435

2) F. Hinterberger et al. Nucl.Instr. 130(1975) 335+347
M. Agena et al., IEEE NS 26, 2156, (1979)

PLAN VIEW OF FACILITY, COMMENTS, ETC