ENTRY NO. 32

NAME OF MACHINE Munich Compact Cyclotron

INSTITUTION Technical University Munich

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IN CHARGE REPORTED BY E. Huenges

HISTORY AND STATUS

DESIGN, date 1970 Model tests 1971

ENG DESIGN, date 1972

CONSTRUCTION, date 1972

FIRST BEAM, date (or goal) 1973

MAJOR ALTERATIONS Rotating target, copper dee's tritium ion source

COST, ACCELERATOR 1 Million DM

COST, FACILITY, total 1 Million DM

FUNDED BY Bavarian Government

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 5 ENGINEERS 1

TECHNICIANS 2 CRAFTS 1

GRAD STUDENTS involved during year 3

OPERATED BY 2 Research staff or 2 Operators

OPERATION 20 hr/wk. On target 20 hr./wk

TIME DISTR. in house 80 % Outside 20 %

BUDGET, op & dev

FUNDED BY Bavarian Government

RESEARCH STAFF, not included above

USERS, in house 5 outside 10

GRAD STUDENTS involved during year

RESEARCH BUDGET, in house

FUNDED BY

MAGNET

POLE FACE, diameter (compact) 109 cm, R extraction 48 cm

R injection cm

GAP, min 5.4 cm, Field 19 kG
min 17.5 cm, Field 8 kG } at

AVERAGE FIELD at R ext 14 kG } Ampere turns

B max/ < B > 1.36

NUMBER OF SECTORS { compact 4 / separated } Spiral, max - deg

SECTOR ANGLE (SSC) - deg

TRIMMING COILS 4 trimming coils in each hill sector

CONDUCTOR, material and type copper water cooled

STORED ENERGY (cryogenic) MJ

POWER: main coils 25 max, kW; current stability 10^{-4}

trimming coils 1 max, kW; current stability 10^{-4}

WEIGHT: Fe 30 tons; coils tons

COOLING system demineralized water

ION ENERGY (bending limit) E/A = q^2/a^2 MEV/amu

(focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2 38 deg

BEAM APERTURE 2.3 cm; DC Bias 12 kV

TUNED by, coarse mechanic fine capacity

RF 28 to 43 mHz, stable ± 10^{-4}

Orb F 7 to 21 mHz

HARMONICS, RF/Orb F, used 2.4

DEE—Gnd, max 45 kV, min gap 1 cm

STABILITY, (pk-pk noise)/(pk RF volt)

ENERGY GAIN, max 120 kV/turn

RF PHASE, stable to ± deg

RF POWEP input, max 30 kW

FREQUENCY MODULATION, rate - /s

modulator, type -

beam pulse, width -

VACUUM SYSTEM

OPERATING PRESSURE 10^{-5} Torr or mbar

PUMPS, No, Type, Size 2 oil diffusion pumps with 1000 l/s each; alternatively 1 ion getter pump; with 2000 l/s pumping speed for N_2

ION SOURCES

internal ion source, Livingstone type

INJECTION SYSTEM

EXTRACTION SYSTEM

dc s with 70 kV at 1 cm

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 36 + 60 m²; movable m²

TARGET STATIONS 3 in 1

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type -

COMPUTER model -

OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p		22	500	100
d		11	500	100
t		7,2	35	
^{3}He		29	40	25
SECONDARY		(part/s)		

BEAM PROPERTIES

MEASURED		CONDITIONS		
PULSE WIDTH	RF deg	pμ A of	MeV	ions
PHASE EXC. max	RF deg	pμ A of	MeV	ions
EXTRACT eff	%	pμ A of	MeV	ions
RESOL ΔE/E	%	pμ A of	MeV	ions
EMITTANCE (π mm. mrad)	axial / rad	pμ A of	MeV	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS

BIOMEDICAL APPLICAT ISOTOPE PRODUCTIONS 100%

REFERENCES/NOTES

1)

2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.

A fast rotating internal target of 5 cm diameter for a beam power up to 12 kW.
A storage system for absorbing 5000 Ci tritium a non gaseous phase which in connection with a ion getter pump for the cyclotron vacuum allows the safe acceleration of triton with a minimal radioactive pollution.