ENTRY No. C25

NAME OF MACHINE AEG COMPACT CYCLOTRON DATE 01 / 04 / 89

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HISTORY AND STATUS

DESIGN, date 1968 Model tests 1970

ENG DESIGN, date 1970

CONSTRUCTION, date 1972

FIRST BEAM, date (or goal) 1973

MAJOR ALTERATIONS

TRITIUM ION SOURCE SYSTEM

COST, ACCELERATOR 1,5 Mill. DM

COST, FACILITY, total 3 " "

FUNDED BY Bavarian Government

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 2 ENGINEERS 1

TECHNICIANS 3 CRAFTS 2

GRAD STUDENTS involved during year

OPERATED BY x Research staff or x Operators

OPERATION 100 hr/wk, On target 80 hr/wk

TIME DISTR. in house %, Outside %

BUDGET, op & dev 90,000,- DM

FUNDED BY Technical University

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
max 17,5 cm, Field 8 kG } at Ampere turns

AVERAGE FIELD at R ext 14 kG

B max/ <B>

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

SECTOR ANGLE (SSC) deg

TRIMMING COILS 4 Pairs

CONDUCTOR, material and type Copper

STORED ENERGY (cryogenic) MJ

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

trimming coils 2 max, kW ; current stability "

WEIGHT : Fe 25 tons ; coils 5 tons

COOLING system Water

ION ENERGY (bending limit) E/A = 25 q^2/a^2 MeV/amu

(focusing limit) E/A = " q^2/a^2 MeV/amu

ACCELERATION SYSTEM

DEES, number 2 ; angle 63 deg

BEAM APERTURE 2,3 cm ; DC Bias - kV

TUNED by, coarse Short stub fine Trim. Capacitor

RF 28 to 42,5 mHz, stable ± $2 \cdot 10^{-6}$

Orb F to mHz

HARMONICS, RF/Orb F, used 2 , 4

DEE - Gnd, max 50 kV, min gap 2,3 cm

STABILITY, (pk-pk noise)/(pk RF volt) 5×10^{-4}

ENERGY GAIN, max 150 kV/turn

RF PHASE, stable to ± deg

RF POWER input, max 40 kW

FREQUENCY MODULATION, rate /s

modulator, type

beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 5×10^{-7} - 2×10^{-5} Torr or mbar

PUMPS, No, Type, Size 2 oil diffusion pumps

1000 l/s each

ION SOURCES

Internal Livingston Type

INJECTION SYSTEM

EXTRACTION SYSTEM

Electrostatic Septum 70 kV

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 200 m² ; movable m²

TARGET STATIONS 5 in 2 rooms

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	50
d		11	"	"
t		7,3	50	30

SECONDARY (part/s)

BEAM PROPERTIES

	MEASURED	CONDITIONS
PULSE WIDTH	20 RF deg	300. pμA of 22. MeV H^+ Ions
PHASE EXC, max	RF deg	pμA of MeV ions
EXTRACT eff	40-80 %	pμA of MeV ions
RESOL ΔE/E	0,1 %	pμA of MeV H^+/Tions
EMITTANCE (π mm. mrad)	axial / rad	pμA of MeV ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 10% SOLID STATES PHYSICS

BIOMEDICAL APPLICAT. SOLID STATES PHYSICS

ISOTOPE PRODUCTIONS 90%

REFERENCES/NOTES

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

The compact cyclotron is an energy fixed machine with rather high beam intensities for light ions including the radioactive triton beam. It is used nearly exclusively for radioisotope production.
Very strong 57Co-sources of about 1 Curie are produced with the 500 uA proton beam on a high speed rotational target. Biological tracer isotopes, as 28Mg or 42K , are produced using the triton beam.