ENTRY No. C23

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 y 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 } at
max 17,5 cm, Field 8 kG } 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 m^2 ; movable m^2
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. pμ A of 22. MeV H^+ Ions
PHASE EXC, max RF deg	pμ A of MeV Ions
EXTRACT eff 40-80 %	pμ A of MeV Ions
RESOL ΔE/E 0,1 %	pμ A of MeV H^+ / Ions
EMITTANCE (π mm. mrad) { axial / rad }	pμA of MeV Ions

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS 10% SOLID STATES PHYSICS
BIOMEDICAL APPLICAT. 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.