ENTRY NO. 34

NAME OF MACHINE: Karlsruhe Compact Cyclotron

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HISTORY AND STATUS

DESIGN, date: – Model tests:
ENG DESIGN, date: CP42H Cyclotron Corporation
CONSTRUCTION, date: 1979-1982
FIRST BEAM, date (or goal): 1983
MAJOR ALTERATIONS:
COST, ACCELERATOR: 2 Mio $
COST, FACILITY, total: 7.0 Mio $
FUNDED BY: Federal Goverment, TT-Project

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS: – ENGINEERS: 2
TECHNICIANS: 2 CRAFTS: 2
GRAD STUDENTS involved during year: –
OPERATED BY: – Research staff or: – Operators
OPERATION: 100 hr/wk. On target: 90 hr/wk
TIME DISTR. in house: 100 %, outside: %
BUDGET, op & dev: 200 T$
FUNDED BY: Beam Recharges

RESEARCH STAFF, not included above

USERS, in house: outside:
GRAD STUDENTS involved during year:
RESEARCH BUDGET, in house:
FUNDED BY:

MAGNET

POLE FACE, diameter (compact): 120 cm, R-extraction: 53 cm
R injection: cm
GAP, min 5 cm, Field 24 kG
max 12 cm, Field 16 kG at 92.400 Ampere turns
AVERAGE FIELD at R ext: 18.4 kG
B max/<B>: 1.3
NUMBER OF SECTORS: compact 3, separated; Spiral, max: 64 deg
SECTOR ANGLE (SSC): deg
TRIMMING COILS:
CONDUCTOR, material and type: Hollow Copper
STORED ENERGY (cryogenic): MJ
POWER: main coils 100 max kW: current stability 10(-5)
trimming coils: max kW: current stability:
WEIGHT: Fe 35 tons: coils 3 tons
COOLING system: Recirculated Water
ION ENERGY (Bending limit) E/A = 42 q^2/A^2 MeV/amu
(Focusing limit) E/A = q/A MeV/amu

ACCELERATION SYSTEM

DEES, number: 2 angle: 90 deg
BEAM APERTURE: 1.8 cm; DC Bias: 1.5 kV
TUNED by, coarse: fine: Capacitors, Trimmer
RF: to: 26.8 MHz, stable ± 0.5 kHz
Orb F: to: 26.8 MHz
HARMONICS, RF/Orb F, used: 1
DEE–Gnd, max: 35 kV, min gap: 0.5 cm
STABILITY, (pk-pk noise)/(pk RF volt): 10(-4)
ENERGY GAIN, max: 100 kV/turn
RF PHASE, stable to ±: deg
RF POWER input, max.: 100 kW
FREQUENCY MODULATION, rate: /s
modulator, type:
beam pulse, width:

VACUUM SYSTEM

OPERATING PRESSURE: 6×10^{-6} H_2 Torr or mbar
PUMPS, No, Type, Size:
Four 10-inches Diff. Pumps

ION SOURCES

INJECTION SYSTEM

EXTRACTION SYSTEM

Charge Exchange Foil

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed: m^2; movable: m^2
TARGET STATIONS: 6 in 3 rooms
STATIONS served at same time, max:
MAG SPECTROGRAPH, type:
COMPUTER model:
OTHER FACILITIES:

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
H^-	11-42	15-42		150
SECONDARY			(part/s)	

BEAM PROPERTIES

	MEASURED	CONDITIONS
PULSE WIDTH	40 RF deg	200 pμ A of 42 MeV H^- ions
PHASE EXC. max	RF deg	pμ A of MeV ions
EXTRACT eff	100 %	pμ A of MeV ions
RESOL ΔE/E	1 %	pμ A of MeV ions
EMITTANCE		
(π mm-mrad)	10 axial, 10 rad	pμ A of MeV

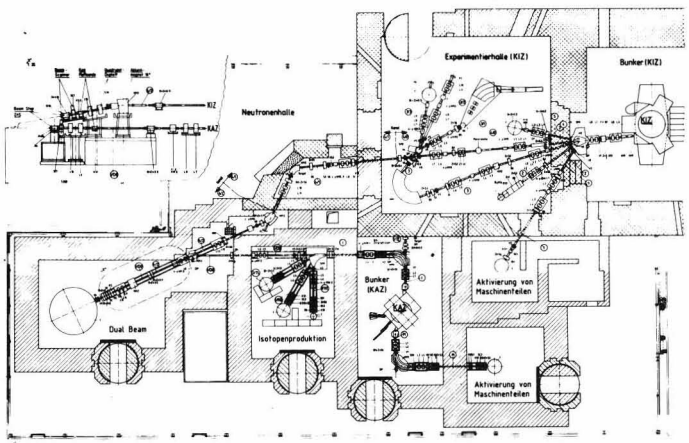
OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS: SOLID STATES PHYSICS:
BIOMEDICAL APPLICAT.: ISOTOPE PRODUCTIONS: 50 %
Ingineering 30 %; Materials Research 20 %

REFERENCES/NOTES

1) G.O. Hendry et al., Design and Performance of a Compact H^--Cyclotron, Proc. 10th Int. Conf. on Cyclotrons and their Applications (Michigan, USA, 1984)

PLAN VIEW OF FACILITY, COMMENTS, ETC.



2) Industrial Applications of the Karlsruhe Compact Cyclotron: V. Bechtold, P. Fehsenfeld and H. Schweickert; these Proceedings