

ENTRY No. FM-5

NAME OF MACHINE Goettingen Synchrocyclotron DATE July 1st, 1981
INSTITUTION Universitaet of Goettingen
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HISTORY AND STATUS

DESIGN, date 1958 Model tests
ENG DESIGN, date
CONSTRUCTION, date 1960-1961
FIRST BEAM, date (or goal) int. beam 1962
MAJOR ALTERATIONS ext. beam 1962

COST, ACCELERATOR DM 4.2 x 10^6
COST, FACILITY, total DM 5.9 x 10^6
FUNDED BY Fed. Rep. of Germany

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 1
TECHNICIANS 2 CRAFTS

GRAD STUDENTS involved during year 3
OPERATED BY Research staff or 2 Operators
OPERATION 50 hr/wk, On target 40 hr/wk
TIME DISTR. in house 90 % , Outside 10 %
BUDGET, op & dev
FUNDED BY Niedersachsen

RESEARCH STAFF, not included above
USERS, in house 20 outside 5
GRAD STUDENTS involved during year 10
RESEARCH BUDGET, in house
FUNDED BY Niedersachsen

MAGNET

POLE FACE, diameter (compact) 180 cm, R extraction 75 cm
R injection ca. 1 cm
GAP, min 35 cm, Field 14.5 kG
max cm, Field kG } at 0.5 x 10^6
AVERAGE FIELD at R ext 14.2 kG } Ampere turns
B max/ <B> :99

NUMBER OF SECTORS { compact } Spiral, max .. deg
{ separated }
SECTOR ANGLE (SSC) deg
TRIMMING COILS

CONDUCTOR, material and type Aluminum
STORED ENERGY (cryogenic) 0.5 MJ
POWER: main coils 250 max, kW ; current stability 3:10^-4
trimming coils max, kW ; current stability 2
WEIGHT: Fe 250 tons ; coils 2 tons
COOLING system Demineralized water
ION ENERGY (bending limit) E/A = 13.9 q^2/a^2 MeV/amu
(focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 1 ; angle 180 deg
BEAM APERTURE 10 cm ; DC Bias 7.5 kV
TUNED by, coarse fixed fine variable cap.
RF 10.6 to 11.1 MHz, stable +/-
Orb F 10.6 to 11.1 MHz
HARMONICS, RF/Orb F, used 1
DEE - Gnd, max 20 kV, min gap fixed 7 cm
STABILITY, (pk-pk noise)/(pk RF volt)
ENERGY GAIN, max 13 kV/turn
RF PHASE, stable to +/- deg
RF POWER input, max 12 kW
FREQUENCY MODULATION, rate 2000 /s
modulator, type rotating capacitor
beam pulse, width 25 us

VACUUM SYSTEM

OPERATING PRESSURE 2 x 10^-6 Torr
PUMPS, No, Type, Size Heraeus 5000 l/s,
Heraeus 1000 l/s

ION SOURCES

internal, gas discharge

INJECTION SYSTEM

EXTRACTION SYSTEM

modified regenerative extraction, magn. channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 160 m^2 ; movable m^2
TARGET STATIONS 5 in 2 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model LSI 11/03
OTHER FACILITIES Gas Transport-System
Coupling to Chemical Separator

CHARACTERISTIC BEAMS

Table with columns: PARTICLE, ENERGY (MeV) Goal, Achieved, CURRENT (pA) Internal, External. Rows for alpha and alpha.

SECONDARY (part/s)

BEAM PROPERTIES

Table with columns: MEASURED, CONDITIONS. Rows for PULSE WIDTH, PHASE EXC, EXTRACT eff, RESOL, EMITTANCE.

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS 70 SOLID STATES PHYSICS 30
BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS

REFERENCES/NOTES

Cyclotron:
W. de Groot: Philips Techn. Rev. Vol 12, No 3 (1950)
G.T. de Kruiff, N.F. Vester: CERN-Report 63-19,80(1963)

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

Other Facilities; N. Instr. Meth. 130, 177 (75);
141, 553 (77); 176, 529 (80)