

ENTRY No. 42

NAME OF MACHINE IMS(Ikaken) Cyclotron DATE 8/1/81
INSTITUTION The Institute of Medical Science, The Univ. of Tokyo
ADDRESS Minato-ku, Tokyo 108, Japan
TEL (03) 446-6771 TELEX
IN CHARGE Akira Ito REPORTED BY Akira Ito

HISTORY AND STATUS

DESIGN, date Model tests
ENG DESIGN, date TCC model, CS-30
CONSTRUCTION, date 1971-1973
FIRST BEAM, date (or goal) Aug., 1973
MAJOR ALTERATIONS replacement of magnet coil (1976)
COST, ACCELERATOR about \$1M (1973)
COST, FACILITY, total about \$1M (1973)
FUNDED BY Japanese Government

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS
TECHNICIANS 3 CRAFTS
GRAD STUDENTS involved during year
OPERATED BY Research staff or Operators
OPERATION 50 hr/wk, On target 40 hr/wk
TIME DISTR. in house 90% Outside 10%
BUDGET, op & dev \$ 0.4M (1980)
FUNDED BY Japanese Government

RESEARCH STAFF, not included above

USERS, in house 6 outside 10
GRAD STUDENTS involved during year 2
RESEARCH BUDGET, in house
FUNDED BY

MAGNET

POLE FACE, diameter (compact) 96 cm, R extraction 42 cm
R injection cm
GAP, min 5 cm, Field 20 kG
max 10 cm, Field 12 kG } at 0.2x10^6
AVERAGE FIELD at R ext 16 kG Ampere turns
B max/ 1.25

NUMBER OF SECTORS { compact 3 } Spiral, max 60 deg
{ separated }
SECTOR ANGLE (SSC) deg
TRIMMING COILS 2 (inner & outer) 1 sec.

CONDUCTOR, material and type
STORED ENERGY (cryogenic) MJ
POWER: main coils 60 max, kW; current stability 10
trimming coils max, kW; current stability
WEIGHT: Fe 23 tons; coils 1 tons
COOLING system demineralized water
ION ENERGY (bending limit) E/A = q^2/a^2 MeV/amu
(focusing limit) E/A = 30 q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2; angle 90 deg
BEAM APERTURE 4 cm; DC Bias 1.5 kV
TUNED by, coarse short bar fine V.c.
RF 14 to 26 MHz, stable +/- 10/10^6
Orb F to MHz
HARMONICS, RF/Orb F, used
DEE - Gnd, max 30 kV, min gap 1 cm
STABILITY, (pk-pk noise)/(pk RF volt) 0.1%
ENERGY GAIN, max kV/turn
RF PHASE, stable to +/- 5 deg
RF POWER input, max 75 kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE less than 10^-5 Torr or mbar
PUMPS, No, Type, Size One diffusion pump
(30 cm dia)

ION SOURCES

PIG type

INJECTION SYSTEM

Internal only

EXTRACTION SYSTEM

DC deflector + mag. channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 330 m^2; movable 0 m^2
TARGET STATIONS 6 in 4 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model PDP-11/40
OTHER FACILITIES Isotopes Production
Neutron therapy
In beam X & Gamma spectroscopy

CHARACTERISTIC BEAMS

Table with columns: PARTICLE, ENERGY (MeV) Goal, Achieved, CURRENT (pA) Internal, External. Rows include P, d, 3He, alpha, and SECONDARY Be (d, n) with En=6MeV.

BEAM PROPERTIES

MEASURED CONDITIONS
PULSE WIDTH 10 RF deg 1 pA of 28 MeV alpha ions
PHASE EXC, max RF deg pA of MeV ions
EXTRACT EFF 60% 100 pA of 14 MeV d ions
RESOL DELTA E/E 1% 1 pA of 14 MeV d ions
EMITTANCE
(pi mm. mrad) { 10 axial } 1 pA of 14 MeV d ions
{ 14 rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS 20%
BIOMEDICAL APPLICAT. 60% ISOTOPE PRODUCTIONS 10%
Development 10%

REFERENCES/NOTES

Y. Yoshida et al., Nucl. Instr. & Meth.,
Vol. 138, pp. 579-788 (1976).

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

1) Plan view of IMS cyclotron

