

ENTRY No. CU61

NAME OF MACHINE IMS(IKAKEN) Cyclotron DATE 6-MAR-1989
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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 \$0.14M(1986)
FUNDED BY Japanese Government
RESEARCH STAFF, not included above
USERS, in house 6 outside 10
GRAD STUDENTS involved during year 0
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 } at 0.2 X 10⁶
max 10 cm, Field 12 kG }
AVERAGE FIELD at R ext 16 kG } Ampere turns
B max/ 1.25
NUMBER OF SECTORS { compact 3 } Spiral, max 60deg
SECTOR ANGLE (SSC) { separated } deg
TRIMMING COILS 2 (inner & outer) /sec.
CONDUCTOR, material and type
STORED ENERGY (cryogenic) MJ
POWER: main coils 50 max, kW; current stability 10⁻⁵
trimming coils max, kW; current stability
WEIGHT: Fe 23 tons; coils 1 tons
COOLING system demineralized water
ION ENERGY (bending limit) E/A = q²/a² MeV/amu
(focusing limit) E/A = 30 q²/a² 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 $\pm 10/10^6$
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 m²; movable 0 m²

TARGET STATIONS 6 In 4 rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type

COMPUTER model VAX 11/750, PDP-11/34 & Lecroy 3500

OTHER FACILITIES Isotopes production

Neutron therapy

PIXE & Proton CT / Microbeam

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)	CURRENT (pA)	
Goal	Achieved	Internal External	
P	26	70	
d	14	150	
³ He	38	70	
⁴ He	28	50	

SECONDARY

Be (d,n)

(part/s)

$\bar{E}_n = 6$ MeV

BEAM PROPERTIES

MEASURED	CONDITIONS
PULSE WIDTH 10 RF deg	1 μ A of 28 MeV d. ions
PHASE EXC, max RF deg	1 μ A of MeV ions
EXTRACT eff 60 %	100 μ A of 14 MeV d. ions
RESOL $\Delta E/E$ 1 %	1 μ A of 14 MeV d. ions
EMITTANCE	

(π mm. mrad) { 10. axial } 1 μ A of 14 MeV d. ions
14. rad

OPERATING PROGRAMS, time distribution

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

REFERENCES/NOTES

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

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

