

ENTRY No. CU64

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 }
 max 10 cm, Field 12 kG } at 0.2 X 10⁶
 AVERAGE FIELD at R ext 16 kG } Ampere turns
 B max/ 1.25

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

CONDUCTOR, material and type
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 60 max, kW; current stability 10⁻⁵
 trimming coils max, kW; current stability

WEIGHT: Fe 23 tons; coils 1 tons
 COOLING system deminorized 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 ± 10/10⁶
 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 (μA) | |
|----------|--------------|----------|--------------|----------|
| | Goal | Achieved | Internal | External |
| P | | .26 | | 70 |
| d | | .14 | | 150 |
| He | | .38 | | 70 |
| α | | .28 | | 50 |

SECONDARY Be (d,n) (part/s)
 E_n = 6 MeV

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 10 RF deg 1 μA of .28 MeV α ions
 PHASE EXC, max RF deg μA of MeV ions
 EXTRACT eff .60 % 100 μA of .14 MeV d ions
 RESOL ΔE/E .1 % 1 μA of .14 MeV d ions
 EMITTANCE
 (π mm. mrad) { 10. axial }
 { 14. rad } .1 μA of .14 MeV d ions

OPERATING PROGRAMS, time distribution
 BASIC NUCLEAR PHYSICS 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

