

ENTRY No. 57
 NAME OF MACHINE 715 CYCLOTRON-RIKEN DATE May 1989
 INSTITUTION RIKEN
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 IN CHARGE H. Kamitsubo REPORTED BY A. Goto

HISTORY AND STATUS

DESIGN, date Model tests
 ENG DESIGN, date
 CONSTRUCTION, date May 1987-March 1989
 FIRST BEAM, date (or goal) April 1989
 MAJOR ALTERATIONS
 COST, ACCELERATOR
 COST, FACILITY, total
 FUNDED BY Science and Technology Agency
ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
 SCIENTISTS and ENGINEERS same as RRC
 TECHNICIANS CRAFTS
 GRAD STUDENTS involved during year
 OPERATED BY Research staff or Operators
 OPERATION hr/wk, On target hr/wk
 TIME DISTR. in house %, Outside %
 BUDGET, op & dev
 FUNDED BY
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) 172.6 cm, R extraction 71.4 cm
 R injection 1.63 cm
 GAP, min 12.8 cm, Field 20.2 kG }
 max 30 cm, Field 11.4 kG } at 320,000.
 AVERAGE FIELD at R ext 17.0 kG } Ampere turns
 B max/
 NUMBER OF SECTORS { compact 4 } Spiral, max 50 deg
 separated
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS 9 pairs
 CONDUCTOR, material and type OFHC Square Tube
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 150 max, kW; current stability $\pm 1 \times 10^{-5}$
 trimming coils 10 max, kW; current stability $\pm 2 \times 10^{-4}$
 WEIGHT: Fe 102 tons; coils 5.5 tons
 COOLING system Closed loop demineralized water
 ION ENERGY (bending limit) E/A = 7.0 q²/a² MeV/amu
 (focusing limit) E/A = q²/a² MeV/amu
ACCELERATION SYSTEM
 DEES, number 2; angle 85 deg
 BEAM APERTURE 2.4 cm; DC Bias kV
 TUNED by, coarse MS fine MP
 RF 12 to 24 MHz, stable $\pm 10^{-6}$
 Orb F .6 to 1.2 MHz
 HARMONICS, RF/Orb F, used 2
 DEE - Gnd, max 50 kV, min gap 3.7 cm
 STABILITY, (pk-pk noise)/(pk RF volt) 1. x 10⁻³
 ENERGY GAIN, max 200 kV/turn
 RF PHASE, stable to ± 0.2 deg
 RF POWER input, max 60 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width
VACUUM SYSTEM
 OPERATING PRESSURE 5 x 10⁻⁸ Torr or mbar
 PUMPS, No, Type, Size TMP 1500 l/s x 1
 CRYO 6500 l/s x 1
 CRYO 4000 l/s x 1
ION SOURCES
 ECR, Duoplasmatron

INJECTION SYSTEM

Axial, Solenoid, Sprial inflector
EXTRACTION SYSTEM
 Reflector, Magnetic channel, Passive focusing channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed m²; movable m²
 TARGET STATIONS in rooms
 STATIONS served at same time, max
 MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pA)	
	Goal	Achieved	Internal	External
P	10 MeV			
N	7 MeV/u	7 MeV/u		
Ar	5.2 MeV/u			

SECONDARY

(part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH RF deg pA of MeV ions
 PHASE EXC, max RF deg pA of MeV ions
 EXTRACT eff % pA of MeV ions
 RESOL $\Delta E/E$ % pA of MeV ions
 EMITTANCE
 (π mm. mrad) { axial } pA of MeV ions
 { rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS .. SOLID STATES PHYSICS ..
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS ..

REFERENCES/NOTES

1) A. Goto et al. : this conference

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

This cyclotron is used mainly as an injector for RIKEN Ring Cyclotron(RRC). Upon coupling with RRC, the final energies will go up to 210 MeV, 135 MeV/u and 95 MeV/u for protons, nitrogen ions and argon ions, respectively.