ENTRY NO. 58

NAME OF MACHINE: INS SF Cyclotron — DATE: September, 1986
INSTITUTION: Institute for Nuclear Study, University of Tokyo
ADDRESS: Midori-cho 3-2-1, Tanashi-shi, Tokyo, Japan
TEL: 0424-61-4131 — TELEX: INSUT J34273
IN CHARGE: M. Sekiguchi — REPORTED BY: M. Sekiguchi

HISTORY AND STATUS

DESIGN, date: 1968 — Model tests: 1968-1970
ENG DESIGN, date: 1969-1970
CONSTRUCTION, date: 1969-1973
FIRST BEAM, date (or goal): Extracted, 1974
MAJOR ALTERATIONS: Deflector system (1978)
MOPA rf system (1980)
COST, ACCELERATOR: $\sim 3 \times 10^8$ yen
COST, FACILITY, total: $\sim 7 \times 10^8$ yen
FUNDED BY: Japan Ministry of Education

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS: 4 — ENGINEERS: 3
TECHNICIANS: 2 — CRAFTS: 2
GRAD STUDENTS involved during year: 0
OPERATED BY: 1/2 Research staff or 1/2 Operators
OPERATION: 140 hr/wk. On target: 100 hr/wk
TIME DISTR. in house: $\sim$ 50 %, outside: $\sim$ 50 %
BUDGET, op & dev: 1.0×10^8 yen
FUNDED BY: Japan Ministry of Education

RESEARCH STAFF, not included above

USERS, in house: 15 — outside: 50
GRAD STUDENTS involved during year: 2
RESEARCH BUDGET, in house: 5×10^7 yen
FUNDED BY: Japan Ministry of Education

MAGNET

POLE FACE, diameter (compact): 168 cm, R-extraction: 73 cm
R injection: - cm
GAP, min 14.6 cm, Field 19.5 kG
max 22.8 cm, Field 13.2 kG } at 3.8×10^5 Ampere turns
AVERAGE FIELD at R ext: 16.4 kG
B max/<B>: 1.19
NUMBER OF SECTORS: compact 3, separated - — Spiral, max 55 deg
SECTOR ANGLE (SSC): deg
TRIMMING COILS: 11 sets of circular
7 sets of harmonic correction
CONDUCTOR, material and type: Cu and MI cable
STORED ENERGY (cryogenic): MJ
POWER: main coils 260 max kW: current stability 10^{-5}
trimming coils 60 max kW: current stability 10^{-3}
WEIGHT: Fe 130 tons: coils 5 tons
COOLING system: Oil and demineralized water
ION ENERGY: (Bending limit) E/A = 68 q^2/A^2 MeV/amu
(Focusing limit) E/A = 48 q/A MeV/amu

ACCELERATION SYSTEM

DEES, number: 1 — angle: 180 deg
BEAM APERTURE: 4 cm; DC Bias: 0 kV
TUNED by, coarse: Short plate — fine: 2 Trim. cap., auto
RF: 7.4 to 22.5 MHz, stable $\pm$ 10^{-7}
Orb F: 0.9 to 22.5 MHz
HARMONICS, RF/Orb F, used: 1, 3, 5, 7, 9
DEE–Gnd, max: 70 kV, min gap: 2.8 cm
STABILITY, (pk-pk noise)/(pk RF volt): 2×10^{-4}
ENERGY GAIN, max: 70 q kV/turn
RF PHASE, stable to $\pm$: 0.5 deg
RF POWER input, max.: 150 kW
FREQUENCY MODULATION, rate: /s
modulator, type:
beam pulse, width:

VACUUM SYSTEM

OPERATING PRESSURE: 5×10^{-7} Torr or mbar
PUMPS, No, Type, Size: 36 inch and 10 inch oil diffusion pumps

ION SOURCES

Internal filament and cold cathode PIG

INJECTION SYSTEM

Axial injection for p and d

EXTRACTION SYSTEM

2 channel dc deflector

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed: 950 m^2; movable: m^2
TARGET STATIONS: 11 in 6 rooms
STATIONS served at same time, max: 1
MAG SPECTROGRAPH, type: QDD
COMPUTER model: FACOM U400, M360R
OTHER FACILITIES: 80 cm dia. scatt. chamber, semi-circular scatt. chamber for pγ-correl., Inbeam γ-ray facility, one-line isotope separator

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	48	45		10
α	68	68		5
$^{23}Na^{4+}$		41		0.5
$^{27}Al^{5+}$		55		0.2
SECONDARY			(part/s)	

BEAM PROPERTIES

MEASURED		CONDITIONS			
PULSE WIDTH	15 RF deg	1	pμA of 60 MeV	α	ions
PHASE EXC. max	RF deg		pμA of MeV		ions
EXTRACT eff.	80 %	5	pμA of 45 MeV	p	ions
RESOL ΔE/E	0.1 %	1	pμA of 22 MeV	p	ions
EMITTANCE					
(π mm-mrad)	18 axial, 13 rad	0.1	pμA of 50 MeV	α	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS: 75 — SOLID STATES PHYSICS: 5
BIOMEDICAL APPLICAT.: 10 — ISOTOPE PRODUCTIONS: 10

REFERENCES/NOTES

1) Proc. 7th Cyclotron Conf., p.103 and 312(1975)
2) Proc. 8th Cyclotron Conf., p.1984(1978)

PLAN VIEW OF FACILITY, COMMENTS, ETC.