

ENTRY No. C71
NAME OF MACHINE Princeton AVF Cyclotron DATE March 21, 1989
INSTITUTION PRINCETON UNIVERSITY, Department of Physics
ADDRESS Jadwin Hall, P.O. Box 708, Princeton, New Jersey 08544
TEL (609) 452-4425 TELEX 4993512/JADWIN TELEFAX: (609) 243-7300
IN CHARGE Robert A. Naumann REPORTED BY Richard T. Kouzes

HISTORY AND STATUS

DESIGN, date 1965 Model tests
ENG DESIGN, date 1966-1967
CONSTRUCTION, date 1967-1968
FIRST BEAM, date (or goal) December 1968
MAJOR ALTERATIONS None

COST, ACCELERATOR \$1.45M
COST, FACILITY, total \$3.0M
FUNDED BY 70% University; 30% AEC

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
SCIENTISTS 0 ENGINEERS 1
TECHNICIANS 3 CRAFTS 0

GRAD STUDENTS involved during year 1
OPERATED BY X Research staff or Operators
OPERATION 60 hr/wk, On target 50 hr/wk

TIME DISTR. in house 75 % Outside 25 %
BUDGET, op & dev \$300K
FUNDED BY NSF

RESEARCH STAFF, not included above
USERS, in house 11 outside 34
GRAD STUDENTS involved during year 6
RESEARCH BUDGET, in house \$800K
FUNDED BY NSF

MAGNET
POLE FACE, diameter (compact) 175 cm, R extraction 75 cm
R injection 2 cm

GAP, min 17 cm, Field 19.5 kG
max 50 cm, Field 8.0 kG } at 5.1×10^6
AVERAGE FIELD at R ext 15 kG } Ampere turns
B max/ < B > 1.3

NUMBER OF SECTORS { compact 3 } Spiral, max < 5 deg
{ separated 3 }
SECTOR ANGLE (SSC) 8 deg
TRIMMING COILS 8

CONDUCTOR, material and type Cu
STORED ENERGY (cryogenic) MJ
POWER: main coils 175 max, kW; current stability 10^{-5}
trimming coils 20 max, kW; current stability 10^{-5}

WEIGHT: Fe 100 tons; coils 16 tons
COOLING system Water
ION ENERGY (bending limit) E/A = 60 q^2/a^2 MeV/amu
(focusing limit) E/A = 60 q^2/a^2 MeV/amu

ACCELERATION SYSTEM
DEES, number 2; angle 134 deg
BEAM APERTURE 4.5 cm; DC Bias 0 kV
TUNED by, coarse Movable Panels fine

RF 14 to 23.5 MHz, stable $\pm 10^{-7}$
Orb F 3.5 to 20.6 MHz
HARMONICS, RF/Orb F, used 1, 2, 4
DEE - Gnd, max 70 kV, min gap 1 cm
STABILITY, (pk-pk noise)/(pk RF volt) 0.001
ENERGY GAIN, max 250 kV/turn
RF PHASE, stable to ± 1 deg
RF POWER input, max 300 kW
FREQUENCY MODULATION, rate /s

modulator, type
beam pulse, width
VACUUM SYSTEM
OPERATING PRESSURE 2.5×10^{-6} Torr or mbar
PUMPS, No, Type, Size 1 Diffusion 32 inch

ION SOURCES
... Hotbed Arc; Cold Cathode

INJECTION SYSTEM

Internal Injection
EXTRACTION SYSTEM
Electrostatic & Magnetic

FACILITIES FOR RESEARCH
SHIELDED AREA, fixed 0 m^2 ; movable 325 m^2
TARGET STATIONS 8 in 4 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type 14 msc, QDDP, $p/AP=10^4$
COMPUTER model Data General MV4000, MVLQ000
OTHER FACILITIES Scattering Chambers, 150 cm, On-Line
Recirculating Gas Target, Bombardement Box, Laser
Polarized Target, On-Line Isotope Separator

CHARACTERISTIC BEAMS
PARTICLE ENERGY (MeV) CURRENT (pA)
Goal Achieved Internal External

p 50 48 20
d 30 28 15
³He 75 85 8
⁴He 60 58 8

SECONDARY (part/a)

BEAM PROPERTIES
MEASURED CONDITIONS
PULSE WIDTH ± 1.8 RF deg 1 pA of .42 MeV p. ions
PHASE EXC, max RF deg 1 pA of .42 MeV p. ions
EXTRACT eff 95 % 1 pA of .42 MeV p. ions
RESOL $\Delta E/E$ 95 % 1 pA of .42 MeV p. ions
EMITTANCE

(π mm. mrad) { .20 axial } 1 pA of .42 MeV p. ions
{ .3. rad }

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS 100 SOLID STATES PHYSICS 0
BIOMEDICAL APPLICAT. 0 ISOTOPE PRODUCTIONS 0

REFERENCES/NOTES
1) Pollock, R.E., Proceedings of the Fifth International
Cyclotron Conference (1969), p. 120.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES,
COMMENTS

