ENTRY NO. 93

NAME OF MACHINE Princeton AVF Cyclotron

INSTITUTION Princeton University Physics Department

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IN CHARGE F. Calaprice REPORTED BY R. 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 2 CRAFTS 0

GRAD STUDENTS involved during year 0

OPERATED BY ✓ Research staff or Operators

OPERATION 60 hr/wk. On target 50 hr./wk

TIME DISTR. in house 90 % Outside 10 %

BUDGET, op & dev $300K

FUNDED BY NSF

RESEARCH STAFF, not included above

USERS, in house 13 outside 15

GRAD STUDENTS involved during year 11

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
min 50 cm, Field 8.0 kG
at $.51 \times 10^6$ Ampere turns

AVERAGE FIELD at R ext 15 kG

B max/ < B > 1.3

NUMBER OF SECTORS compact 3
separated
Spiral, max 0 deg

SECTOR ANGLE (SSC) 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/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2 138 deg

BEAM APERTURE 4.5 cm; DC Bias 0 kV

TUNED by, coarse movable panels fine None

RF 11.2 to 24.5 mHz, stable ± 10^{-7}

Orb F .5.6 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) .0005

ENERGY GAIN, max 250 kV/turn

RF PHASE, stable to ± 2 deg

RF POWEP input, max 300 kW

FREQUENCY MODULATION, rate - /s

modulator, type -

beam pulse, width -

VACUUM SYSTEM

OPERATING PRESSURE 5×10^{-6} Torr or mbar

PUMPS, No, Type, Size 1 Diffusion 32 inch

ION SOURCES

Hooded Arc; Cold Cathode

INJECTION SYSTEM

EXTRACTION SYSTEM

Electrostatic & magnetic

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 0 m²; movable 325 m²

TARGET STATIONS 8 in 4

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type 14 msr QDDD $p/\Delta P = 10^4$

COMPUTER model Data General Eclipse

OTHER FACILITIES Scattering Chambers 150, 50, 30 cm.; On-Line Recirculating Gas Target; Orange Spectrometer; Pair Spectrometer; On-Line Atomic Beams Machine; On-line isotope separator

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	50	48		20
d	30	28		15
^{3}He	75	85		8
α	60	58		8
SECONDARY		(part/s)		

BEAM PROPERTIES

	MEASURED	CONDITIONS
PULSE WIDTH	1.6 RF deg	1 pμ A of 42 MeV p ions
PHASE EXC. max	RF deg	pμ A of MeV ions
EXTRACT eff	95 %	1 pμ A of 42 MeV p ions
RESOL ΔE/E	.05 %	1 pμ A of 42 MeV p ions
EMITTANCE (π mm. mrad)	.20 axial, 3 rad	1 pμ A of 42 MeV p

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 100 SOLID STATES PHYSICS 0

BIOMEDICAL APPLICAT 0 ISOTOPE PRODUCTIONS 0

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

PLAN VIEW OF FACILITY, COMMENTS, ETC.