

ENTRY NO. FM-9
 NAME OF MACHINE 184-Inch Synchrocyclotron
 INSTITUTION Lawrence Berkeley Laboratory
 ADDRESS 1 Cyclotron Road, Berkeley, CA 94720, USA
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 IN CHARGE J. Alonso REPORTED BY Ross Nemetz

HISTORY AND STATUS

DESIGN, date Model tests
 ENG DESIGN, date
 CONSTRUCTION, date
 FIRST BEAM, date (or goal) 1946
 MAJOR ALTERATIONS 1949, 1955-57

COST, ACCELERATOR
 COST, FACILITY, total
 FUNDED BY National Institute of Health

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS
 TECHNICIANS 1 CRAFTS 5

GRAD STUDENTS involved during year
 OPERATED BY Research staff or 3 Operators
 OPERATION 25 hr/wk. On target 24 hr/wk
 TIME DISTR. in house 99 % Outside 1 %
 BUDGET, op & dev \$315 x 10³
 FUNDED BY

RESEARCH STAFF, not included above
 USERS, in house 3 outside 2
 GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house
 FUNDED BY National Institute of Health

MAGNET

POLE FACE, diameter (compact) cm, R extraction cm
 R injection cm
 GAP, min 28 cm, Field 23.4 kG }
 min cm, Field kG } at
 AVERAGE FIELD at R ext 22.3 kG } Ampere turns
 B max / < B >
 NUMBER OF SECTORS { compact } Spiral, max deg
 { separated }
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS

CONDUCTOR, material and type
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 850/1600 max, kW; current stability 10⁻⁵
 trimming coils max, kW; current stability
 WEIGHT: Fe 4000 tons; coils 340 tons
 COOLING system oil/water
 ION ENERGY (bending limit) E/A = 920 q²/a² MEV/amu
 (focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 1, angle 180 deg
 BEAM APERTURE 12.3 cm; DC Bias 1.5 kV
 TUNED by, coarse fine
 RF 36 to 18 MHz, stable ±
 Orb F 36 to 18 MHz
 HARMONICS, RF/Orb F, used
 DEE-Gnd, max kV, min gap 12 cm
 STABILITY, (pk-pk noise)/(pk RF volt)
 ENERGY GAIN, max kV/turn
 RF PHASE, stable to ± deg
 RF POWER input, max 72 kW
 FREQUENCY MODULATION, rate 64 /s
 modulator, type vibrating blades
 beam pulse, width 2-13 ms, stretching off/on

VACUUM SYSTEM

OPERATING PRESSURE 10⁻⁵ Torr or mbar
 PUMPS, No, Type, Size Six 20 inch oil diffusion pumps.

ION SOURCES

Hot filaments open arc

INJECTION SYSTEM

EXTRACTION SYSTEM

Regenerator and magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed m²; movable 55 m²
 TARGET STATIONS 1 in 1 room
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
p		740	1	12
d		460	1	12
α		920	5	06

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH RF deg μA of MeV ions
 PHASE EXC. max RF deg μA of MeV ions
 EXTRACT eff 12 % 12 μA of 740 MeV p ions
 RESOL ΔE/E % μA of MeV ions
 EMITTANCE
 (π mm. mrad) { axial } μA of MeV
 { separated }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT 100 ISOTOPE PRODUCTIONS

REFERENCES/NOTES

- 1)
- 2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.