

ENTRY No. 90

NAME OF MACHINE .88-Inch Cyclotron DATE .4. May. 1989
INSTITUTION .Lawrence Berkeley Laboratory
ADDRESS .1 Cyclotron Road, Berkeley, CA 94720, U.S.A.
TEL .415-486-5088 TELEX .910-366-2037
IN CHARGE .F. Stephens REPORTED BY .D. J. Clark

HISTORY AND STATUS

DESIGN, date .1958 Model tests .1958-59
ENG DESIGN, date .1959-61
CONSTRUCTION, date .1959-62
FIRST BEAM, date (or goal) Internal 1961, External 1962
MAJOR ALTERATIONS .External injection with polarized ions, MOPA RF system, ECR source 1984
COST, ACCELERATOR \$3.5 x 10^6 (1962)
COST, FACILITY, total \$5.1 x 10^6 (1962)
FUNDED BY .U.S. Dept. of Energy
ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
SCIENTISTS .2 ENGINEERS .3
TECHNICIANS .11 CRAFTS .2
GRAD STUDENTS involved during year .0
OPERATED BY .0 Research staff or .5 Operators
OPERATION .140 hr/wk, On target .95 hr/wk
TIME DISTR. in house .70 % Outside .30 %
BUDGET, op & dev
FUNDED BY .U.S. Dept. of Energy
RESEARCH STAFF, not included above
USERS, in house .30 outside .110
GRAD STUDENTS involved during year .15
RESEARCH BUDGET, in house
FUNDED BY .Dept. of Energy

MAGNET

POLE FACE, diameter (compact) 224 cm, R extraction .99 cm
R injection .0 cm
GAP, min .19 cm, Field .21 kG
max .30 cm, Field .15 kG } at .64 x 10^6
AVERAGE FIELD at R ext .18 kG } Ampere turns
B max/ .1.17

NUMBER OF SECTORS { compact .3 } Spiral, max 5.5 deg
{ separated .3 }

SECTOR ANGLE (SSC) .17 deg

TRIMMING COILS .17 circular

.5 Valley harmonic

CONDUCTOR, material and type Copper, hollow water-cooled

STORED ENERGY (cryogenic) MJ

POWER: main coils .700 max, kW; current stability 10^-5
trimming coils .600 max, kW; current stability 10^-3

WEIGHT: Fe .290 tons; coils .10 tons

COOLING system Demineralized water

ION ENERGY (bending limit) E/A = .160 q^2/a^2 MeV/amu
(focusing limit) E/A = .70 q^2/a^2 MeV/amu

ACCELERATION SYSTEM

DEES, number .1; angle .180 deg

BEAM APERTURE .3.8 cm; DC Bias .0 kV

TUNED by, coarse Moving panels fine Variable capacitor

RF .5.5 to .16.2 MHz, stable +/- 10^-8

Orb F .1.1 to .16.2 MHz

HARMONICS, RF/Orb F, used .1, 3, 5, 7

DEE - Gnd, max .50 kV, min gap (Puller) .1 cm

STABILITY, (pk-pk noise)/(pk RF volt) .10^-3

ENERGY GAIN, max .100 kV/turn

RF PHASE, stable to +/- deg

RF POWER input, max .300 kW

FREQUENCY MODULATION, rate .0 /s

modulator, type

beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE .1 x 10^-6 Torr or mbar

PUMPS, No, Type, Size .4 Oil Diffusion pumps

(2 - 81 cm, 2 - 25 cm), 20° K Cryopanel

ION SOURCES

.Internal filament, External polarized and ECR.

INJECTION SYSTEM

.Internal source, External sources with axial injection

EXTRACTION SYSTEM

.Electrostatic, 3 section

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed .m^2; movable .800 m^2

TARGET STATIONS .12 in .8 rooms

STATIONS served at same time, max .1

MAG SPECTROGRAPH, type .QSD, LBL Design

COMPUTER model .ModComp Classic (2), VAX 780

OTHER FACILITIES .Isotope production, On-line mass separator (He jet), Transuranium chemistry, In-beam gamma ray ball, Polarimeter, TOF system.

CHARACTERISTIC BEAMS

Table with columns: PARTICLE, ENERGY (MeV) Goal, Achieved, CURRENT (pA) Internal, External. Rows include p, 4He2+, O2+, 8+, D2+, 28+.

BEAM PROPERTIES

MEASURED CONDITIONS
PULSE WIDTH 10-20 RF deg .5 pu A of .65 MeV 4He ions
PHASE EXC, max 10 RF deg .5 pu A of .1 MeV .1 ions
EXTRACT eff .50 % .5 pu A of .1 MeV .1 ions
RESOL AE/E .3 % .5 pu A of .1 MeV .1 ions
EMITTANCE
(pi mm. mrad) { 22 axial } .5 pu A of .1 MeV .1 ions
{ 16 rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS .80 SOLID STATES PHYSICS .15

BIOMEDICAL APPLICAT. . ISOTOPE PRODUCTIONS .2

Development - 3

REFERENCES/NOTES

*Installed, 300 kW max. used.
International Cyclotron Conferences
Nucl. Instr. & Meth. 154, 1 (1978)
Nucl. Instr. & Meth. Phys. Res. A270 (1988), p. 198
International ECR Workshops

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

