

ENTRY No. 91

NAME OF MACHINE DAVIS 76" CYCLOTRON DATE July 28, 1981
 INSTITUTION CROCKER NUCLEAR LABORATORY, UNIVERSITY OF CALIFORNIA, DAVIS, CA.
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 IN CHARGE TOM CAHILL REPORTED BY TOM CAHILL

HISTORY AND STATUS

DESIGN, date Model tests
 ENG DESIGN, date ORIC copy
 CONSTRUCTION, date 1964-1966
 FIRST BEAM, date (or goal) 1966
 MAJOR ALTERATIONS none

COST, ACCELERATOR 1.4×10^6
 COST, FACILITY, total 4.5×10^6
 FUNDED BY AEC, U.C., N.S.F.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 2
 TECHNICIANS 2 CRAFTS 2
 GRAD STUDENTS involved during year 7
 OPERATED BY 1/5 Research staff or 4/5 Operators
 OPERATION 128 hr/wk, On target 50 hr/wk
 TIME DISTR. in house 70 %, Outside 30 %
 BUDGET, op & dev \$280,000
 FUNDED BY Beam Recharges

RESEARCH STAFF, not included above
 USERS, in house 20 outside 30
 GRAD STUDENTS involved during year 20
 RESEARCH BUDGET, in house \$500,000
 FUNDED BY Medical, use, EPA, NSF, NOAA, etc.

MAGNET Modified Berkeley 60" Magnet
 POLE FACE, diameter (compact) 193 cm, R extraction 80 cm
 R injection cm
 GAP, min 19 cm, Field 22.7 kG }
 max 71 cm, Field 12.7 kG } at 0.8×10^6
 AVERAGE FIELD at R ext 17.5 kG } Ampere turns
 B max/ 1.3

NUMBER OF SECTORS { compact 3 } Spiral, max 30 deg
 separated }
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS 10

CONDUCTOR, material and type hollow copper
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 800 max, kW; current stability $\pm 10^{-5}$
 trimming coils 800 max, kW; current stability $\pm 10^{-5}$
 WEIGHT: Fe 268 tons; coils 42 tons
 COOLING system deionized water
 ION ENERGY (bending limit) E/A = .90 q²/a² MeV/amu
 (focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 1; angle 180 deg
 BEAM APERTURE 4.5 cm; DC Bias 0 kV
 TUNED by, coarse MS, fine VC, auto
 RF 7.3 to 22 MHz, stable $\pm 1/10^6$
 Orb F 1.5 to 2.2 MHz
 HARMONICS, RF/Orb F, used 1, 3
 DEE - Gnd, max 120 kV, min gap 1 cm
 STABILITY, (pk-pk noise)/(pk RF volt) 0.005
 ENERGY GAIN, max 240 kV/turn
 RF PHASE, stable to ± 10 deg
 RF POWER input, max 150 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 2×10^{-7} Torr or mbar
 PUMPS, No, Type, Size 2, diffusion, 2 m

ION SOURCES

hot filament, modified LBL 88" source

INJECTION SYSTEM

none

EXTRACTION SYSTEM

electrostatic +2 magnetic

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 360 m²; movable 0 m²
 TARGET STATIONS 9 in 3 rooms
 STATIONS served at same time, max 1 (but tandem targets)
 MAG SPECTROGRAPH, type
 COMPUTER model PDP 11/40, 2 PDP 11/40, PDP 11/44
 OTHER FACILITIES space effects;
 isotope production; PIXE system; n beams; pol. and
 unpol. biological

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (µA)	
	Goal	Achieved	Internal	External
p		4 to 68		20 µA
d		15 to 45		40 µA
³ He		20 to 90		1 µA
⁴ He		16 to 90		40 µA
SECONDARY				(part/s)
n		15 to 65		2×10^6
nt		15 to 50		5×10^5

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 1° RF deg 20 µA of 65 MeV p ions
 PHASE EXC, max RF deg µA of MeV ions
 EXTRACT eff % µA of MeV ions
 RESOL ΔE/E % µA of MeV ions
 EMITTANCE
 (π mm. mrad) { axial } µA of MeV ions
 { rad }

OPERATING PROGRAMS, time distribution
 BASIC NUCLEAR PHYSICS 5% SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS
¹²³I 30%; ¹³¹I 5%; PIXE analysis 25%, Chem. 5%;
 other isotopes, 10%, Misc.

REFERENCES/NOTES

Accelerator has been supported by beam recharges since 1971.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

