

ENTRY NO. 116

NAME OF MACHINE Davis 76" Cyclotron
 INSTITUTION Crocker Nuclear Laboratory
 ADDRESS Davis, California, USA
 TEL (916) 762-1460 TELEX
 IN CHARGE Thomas A. Cahill REPORTED BY CNL Personnel

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 Recharges for beams and services

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1.5 ENGINEERS 1.0
 TECHNICIANS 3.0 CRAFTS 2.0
 GRAD STUDENTS involved during year 3.0
 OPERATED BY Research staff or 3.0 Operators
 OPERATION 140 hr/wk. On target 50 hr/wk
 TIME DISTR. in house 60 %, outside 40 %
 BUDGET, op & dev 500 K\$
 FUNDED BY Recharges for beams and shops

RESEARCH STAFF, not included above

USERS, in house 12 outside 24
 GRAD STUDENTS involved during year 40
 RESEARCH BUDGET, in house 1.0 M\$
 FUNDED BY NPS, EPA, DOE, NSF

MAGNET

POLE FACE, diameter (compact) 193 cm, R-extraction 80 cm
 R injection 19 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 / 13
 NUMBER OF SECTORS 3 } Spiral, max 30 deg
 [compact separated]
 SECTOR ANGLE (SSC) 10 deg
 TRIMMING COILS 10

CONDUCTOR, material and type Hollow copper
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 800 max kW: current stability 5×10^{-4}
 trimming coils 350 max kW: current stability 5×10^{-4}
 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 course short plane trim capacitors
 RF 7.3 to 22.5 MHz, stable $\pm 1/10^6$
 Orb F, 1.5 to 22.5 MHz
 HARMONICS, RF/Orb F, used 1, 3
 DEE-Gnd, max 60 kV, min gap 215 cm
 STABILITY, (pk-pk noise)/(pk RF volt) 0.005
 ENERGY GAIN, max 120 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 10^{-6} Torr or mbar
 PUMPS, No, Type, Size 2 diffusion, 2m

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 m²
 TARGET STATIONS 10 in rooms
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type none
 COMPUTER model PDP 15/40; 2 PDP 11/44; PDP 11/23
 OTHER FACILITIES XRF, PIXE systems; Co-60 irradiation source; hot radiochemical labs; isotope production; large area irradiation; O(n,p) facility; off-line counting station (ND65 & ND66 multichannel analyzers)

PARTICLE	ENERGY (MeV)		CURRENT (μ A)	
	Goal	Achieved	Internal	External
P		4 to 68		30.0
d	15 to 45			40.0
α	16 to 90			40.0
³ He	20 to 90			1.0
SECONDARY n	15 to 65	10^6	(part/s)	

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 8 RF deg 20 μ A of 67.5 MeV P ions
 PHASE EXC. max 42 RF deg 10 μ A of 50.0 MeV ions
 EXTRACT eff. 90 % 20 μ A of 67.5 MeV P ions
 RESOL $\Delta E/E$ 0.4 % 20 μ A of 67.5 MeV P ions
 EMITTANCE
 (π mm-mrad) axial rad μ A of MeV

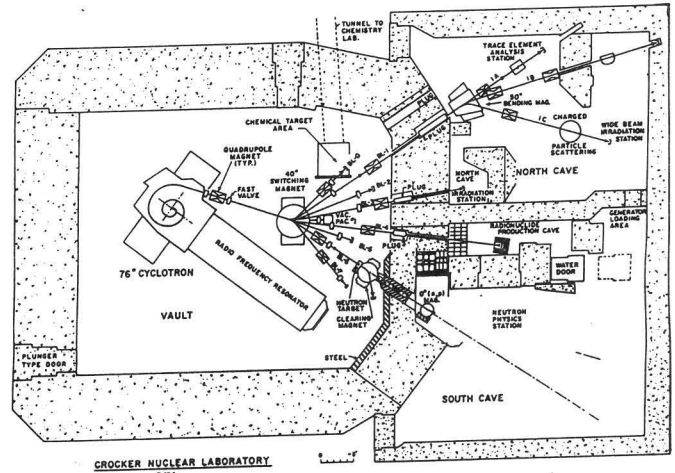
OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 10 % SOLID STATES PHYSICS 30 %
 BIOMEDICAL APPLICAT. 5 % ISOTOPE PRODUCTIONS 15 %
 Atomic 5 %, Analytical Svs. (PIXE) 30 %
 Biological (N-13) 5 %

REFERENCES/NOTES

- 1) Accelerator supported on beam and services recharge since 1971.
- 2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.



CROCKER NUCLEAR LABORATORY