

ENTRY No. 117

NAME OF MACHINE Davis 76" Cyclotron DATE 06/14/89
 INSTITUTION Crocker Nuclear Laboratory, University of California, Davis
 ADDRESS Davis, California 95616 U.S.A.
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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 shops

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
 SCIENTISTS 1.5 ENGINEERS 1.0
 TECHNICIANS 6.0 CRAFTS 2.0
 GRAD STUDENTS involved during year 5
 OPERATED BY Research staff or 4 Operators
 OPERATION 140 hr/wk, On target 50 hr/wk
 TIME DISTR. in house 95 %, Outside 5 %
 BUDGET, op & dev \$750,000
 FUNDED BY recharges for beams and shops

RESEARCH STAFF, not included above
 USERS, in house 12 outside 24
 GRAD STUDENTS involved during year 20
 RESEARCH BUDGET, in house 3.5 million
 FUNDED BY NPS, EPA, DOE, NSF

MAGNET

POLE FACE, diameter (compact) 193 cm, R extraction 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/ 13

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 2.68 tons; coils 42 tons
 COOLING system deionized water
 ION ENERGY (bending limit) E/A = .90 q^2/a^2 MeV/amu
 (focusing limit) E/A = q^2/a^2 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 22 MHz
 HARMONICS, RF/Orb F, used 1.3
 DEE - Gnd, max kV, min gap 1.0 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 4×10^{-7} 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 m^2 ; movable 8 m^2
 TARGET STATIONS 10 in 4 rooms
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type none
 COMPUTER model 3 PDP 11/44; PDP 11/23 μ VAX
 OTHER FACILITIES XRF, PIXE, Systems, Co-60 Irradiation
 source; hot radiochemical labs; isotope production; large area
 irradiation station; 0° -(n,p) facility; off-line count station

CHARACTERISTIC BEAMS (ND65 & ND66 multichannel analyses)

PARTICLE	ENERGY (MeV)		CURRENT (μ A)	
	Goal	Achieved	Internal	External
p		4 to 68		30 μ A
d		15 to 45		40 μ A
α		16 to 90		40 μ A
^3He		20 to 90		1 μ A

SECONDARY

n 15 to 65 10^6 (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 1 RF deg 20 μ A of .65 MeV p ions
 PHASE EXC, max RF deg μ A of MeV ions
 EXTRACT eff μ A of MeV ions
 RESOL $\Delta E/E$ % μ A of MeV ions
 EMITTANCE

(π mm. mrad) { axial } μ A of MeV ions
 { rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 10% SOLID STATES PHYSICS 2%
 BIOMEDICAL APPLICAT. 10% ISOTOPE PRODUCTIONS 20%
 Atomic 5%, Analytical Services (PIXE) PESA, FAST (30%)
 Biological (N-13), 3% Radiation Effects (CPTRS) 20%

REFERENCES/NOTES

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

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

