ENTRY NO. 29

NAME OF MACHINE Juelich Compact Cyclotron (CV 28) DATE July 78
INSTITUTION Kernforschungsanlage Juelich - IFF
ADDRESS Postfach 1913, D-5170 Juelich Germany

IN CHARGE J. L. Hemmerich REPORTED by J. L. Hemmerich

HISTORY AND STATUS

DESIGN, date 1969 MODEL tests 1973
ENG. DESIGN, date 1970
CONSTRUCTION, date 1973 - 1975
FIRST BEAM date (or goal) Oct. 1975
MAJOR ALTERATIONS none

OPERATION, 80 hr/wk; On Target 72 hr/wk
TIME DIST., in house 40 %, outside 60 %
USERS' SCHEDULING CYCLE 5 weeks
COST, ACCELERATOR $ 1 Mio.
COST, FACILITY, total $ 2 Mio.
FUNDED BY German Government

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 1 ENGINEERS 2
TECHNICIANS 4 CRAFTS -
GRAD STUDENTS involved during year -
OPERATED BY - Res staff or 4 Operators
BUDGET, op & dev $ 100,000 per year
FUNDED BY German Government

RESEARCH STAFF, not included above

USERS, in house 6 outside 20
GRAD STUDENTS involved during year -
RES. BUDGET, in house
FUNDED BY

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed ~ 200 m^2
movable - m^2
TARGET STATIONS 8 in 4 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type none
COMPUTER, model PDP 11-40 (1979)
OTHER FACILITIES Pneumatic transfer for internal and 1 external target

REFERENCES/NOTES

J. Hemmerich, R. Hölzle, W. Kogler, Kerntechnik 19 (1977) p.67to70

MAGNET

POLE FACE diameter 96 cm; R extraction 42 cm
GAP, min 5 cm; Field kG } at .2 X 10^6
max 10 cm; Field kG } ampere turns
AVERAGE FIELD at R ext 18.5 kG
CURRENT STABILITY 5 parts/10^6; $B_{max}/\langle B \rangle$
NUMBER OF SECTORS 3 ; SPIRAL, max 60 deg
POLE FACE COIL PAIRS: AVF none /sec;
Harmonic correction 2 coils/sector
Rad grad - /sec or Circ coils 4
WEIGHT: ~~Fe~~ total 23 tons; Coils tons
CONDUCTOR, Material and type Cu-foil
STORED ENERGY MJ
COOLING SYSTEM Demineralized water
POWER: Main coils 60 max, kW
Trimming coils 50 max, kW
YOKE/POLE AREA %
SECTOR ANGLE (Sep Sec) deg
ION ENERGY (Bending limit) E/A = 28 q^2/A^2 MeV
(Focusing limit) E/A = q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 90 deg
BEAM APERTURE 2.5 cm; DC BIAS .5-2 kV
TUNED by, coarse Short, plane fine Var. cap.
RF 6 to 26 mHz, stable ± 1 /10^6
Orb F 6 to 26 mHz; GAIN, max kV/turn
HARMONICS, RF/Orb F, used fundamental
DEE-Gnd, max 30 kV, min gap 1.27 cm
STABILITY, (pk-pk noise)/(pk RF volt) 1×10^{-3}
RF PHASE stable to ± deg
RF POWER input, max 75 kW
RF PROTECT circuit, speed 1 μsec
Type Series pass tube
FREQUENCY MODULATION, rate - /sec
MODULATOR, type -
BEAM PULSE, width -

VACUUM SYSTEM

PUMPS, No., Type, Size 1 Diff. p. 12"
OPERATING PRESSURE 50 μTorr,
PUMPDOWN TIME 1/2 hrs

ION SOURCES/INJECTION SYSTEM

"cold cathode" Penning or thermionic mode

EXTRACTION SYSTEM

d c electrostatic + mag. channel

CONTROL SYSTEM

ENTRY NO. 29 (cont.)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	2-24	2-24
	d	3-14	3-14
	3 He^{++}	5-36	5-36
	α	6-28	6-28
CURRENT		(μA)	(μA)
Internal	p	500	250
	d	500	250
	α	100	200
External	p	70	90
	d	100	110
	α	50	70
		(part/s)	(part/s)
Secondary	n	$3x10^{12}$	$3x10^{12}$

BEAM PROPERTIES

	Measured		Conditions
Pulse Width	____ RF deg	____ μA of ____ MeV	____
Phase Exc, max	____ RF deg	____ μA of ____ MeV	____
Extract Eff	____ %	____ μA of ____ MeV	____
Res, ΔE/E	____ %	____ μA of ____ MeV	____

Emittance

(mm-mrad) { 15 axial / 15 radial } 5 μA of 24 MeV p

OPERATING PROGRAMS, time dist

Basic Nuclear Physics	%
Solid State Physics	40 %
Bio-Medical Applications	20 %
Isotope Production	40 %
Development	%
	%
	%

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES

Originally designed for manual control, all cyclotron and peripheral power supplies are presently redesigned (partly in cooperation with The Cyclotron Corp.) for computer control. System will be installed starting end of 78 parallel to normal cyclotron operation and should be operational (preset and monitor operating parameters, correct longterm drifts etc.) by the end of 1979.