ENTRY NO. 31

NAME OF MACHINE: JULIC

INSTITUTION: Institut für Kernphysik der Kernforschungsanlage Jülich (KFA)

ADDRESS: D-5170 Jülich

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IN CHARGE: Managing director of IKP, 1986 J. Speth REPORTED BY: W. Bräutigam, J. Reich

HISTORY AND STATUS

DESIGN, date: 1963 Model tests: 1963-1965

ENG DESIGN, date: 1964/1965

CONSTRUCTION, date: 1966-1969

FIRST BEAM, date (or goal): int. 1968; ext. 1969

MAJOR ALTERATIONS: 1986: ECR-sources, beam injection

COST, ACCELERATOR: $19 \cdot 10^6$ DM

COST, FACILITY, total: $29 \cdot 10^6$ DM (cycl. + bldg.)

FUNDED BY: Kernforschungsanlage Jülich

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS: 6 ENGINEERS: 3

TECHNICIANS: 6 CRAFTS: 5

GRAD STUDENTS involved during year: –

OPERATED BY: Research staff or 8 Operators

OPERATION: hr/wk. On target: hr/wk

TIME DISTR. in house: %, outside: %

BUDGET, op & dev

FUNDED BY: Kernforschungsanlage Jülich

RESEARCH STAFF, not included above

USERS, in house: outside:

GRAD STUDENTS involved during year

RESEARCH BUDGET, in house

FUNDED BY: Kernforschungsanlage Jülich

MAGNET

POLE FACE, diameter (compact): 330 cm, R-extraction: 154 cm

R injection: cm

GAP, min 8.4 cm, Field 19.2 kG
max 24 cm, Field 7 kG } at 150000

AVERAGE FIELD at R ext: 13.5 kG Ampere turns

B max/<B>: 1.42

NUMBER OF SECTORS: compact 3, separated; Spiral, max 20 deg

SECTOR ANGLE (SSC): deg

TRIMMING COILS: 12

CONDUCTOR, material and type: copper, square hollow

STORED ENERGY (cryogenic): MJ

POWER: main coils 50 max kW: current stability $\pm 2 \cdot 10^{-6}$
trimming coils 12 max kW: current stability $\pm 5 \cdot 10^{-5}$

WEIGHT: Fe 700 tons: coils 12 tons

COOLING system: demineralized water

ION ENERGY (Bending limit) E/A = 180 q^2/A^2 MeV/amu
(Focusing limit) E/A = q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 3 angle 40 deg

BEAM APERTURE 2.4 cm; DC Bias 0 kV

TUNED by, coarse: panels fine: rotating loops

RF 21 to 30 MHz, stable ± $1.3 \cdot 10^{-5}$

Orb F 7 to 10 MHz

HARMONICS, RF/Orb F, used: h=3

DEE–Gnd, max 45 kV, min gap 1 cm

STABILITY, (pk-pk noise)/(pk RF volt): $1 \cdot 10^{-3}$

ENERGY GAIN, max: 240 kV/turn

RF PHASE, stable to ± deg

RF POWER input, max. kW

FREQUENCY MODULATION, rate /s

modulator, type

beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE: 10^{-6} Torr or mbar

PUMPS, No, Type, Size: 3, cryo, nom. 10000 ℓ/s each
2, turbo, 2200 ℓ/s each

ION SOURCES

ECR: .5 and 1.4 GHz

INJECTION SYSTEM

axial; magnetic comp. and hyperboloid infl.

EXTRACTION SYSTEM

electrostatic defl., screening chann., focusing channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 210 m²; movable 915 m²

TARGET STATIONS: 6 in 5 rooms

STATIONS served at same time, max: 1

MAG SPECTROGRAPH, type: QQDDQ (BIG KARL)

COMPUTER model: PDP11, VAX11/780

OTHER FACILITIES: Scattering chambers; In-beam nucl. spectr. equipm.; Bent-crystal spectrom.; Orange type ß-spectrom.; Facilities for isotope production and chemistry

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p,d,τ,α		22.5-45 MeV/A		
N	630	project	ISIS	
O	720	project	ISIS	
Ne	730	project	ISIS	
SECONDARY			(part/s)	

BEAM PROPERTIES

	MEASURED	CONDITIONS
PULSE WIDTH	RF deg	pμA of MeV ions
PHASE EXC. max	RF deg	pμA of MeV ions
EXTRACT eff	%	pμA of MeV ions
RESOL ΔE/E	%	pμA of MeV ions
EMITTANCE (π mm-mrad)	axial	pμA of MeV
	rad	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS: SOLID STATES PHYSICS

BIOMEDICAL APPLICAT.: ISOTOPE PRODUCTIONS

REFERENCES/NOTES

Cyclotron, beam handl.: L. Aldea, W. Bräutigam, R. Brings, C. Mayer-Böricke, J. Reich, P. Wucherer: Status of JULIC, Proc. 9th Int.Conf. on Cycl. and their Appl. (Caen, 1981), p. 103

Project ISIS: L. Aldea, R.K. Bhandari, H.G. Mathews, C. Mayer-Böricke, J. Reich, P. Wucherer, ibid., p. 261, 285, 461

PLAN VIEW OF FACILITY, COMMENTS, ETC.