

ENTRY No. 33  
 NAME OF MACHINE JULIC DATE April 26, 1989  
 INSTITUTION Institut für Kernphysik der Kernforschungsanlage Jülich (KFA)  
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 IN CHARGE R. A. Maier 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 · 10<sup>6</sup> DM  
 COST, FACILITY, total 29 · 10<sup>6</sup> 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 8 Research staff or 8 Operators  
 OPERATION 120 hr/wk, On target  
 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 8.4 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 } Spiral, max 20 deg  
 separated }  
 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 +/- 2 · 10<sup>-6</sup>  
 trimming coils 12 max, kW ; current stability +/- 5 · 10<sup>-5</sup>

WEIGHT: Fe 700 tons ; coils 12 tons  
 COOLING system demineralized water  
 ION ENERGY (bending limit) E/A = 180 q<sup>2</sup>/a<sup>2</sup> MeV/amu  
 (focusing limit) E/A = q<sup>2</sup>/a<sup>2</sup> 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 5  
 RF 21 to 30 MHz, stable ± 1.3 · 10<sup>-3</sup>  
 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 · 10<sup>-3</sup>  
 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<sup>-6</sup> 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 14 GHz

**INJECTION SYSTEM**

axial; magnetic comp. and hyperboloid infl.

**EXTRACTION SYSTEM**

electrostatic defl. screening chann., focusing channel

**FACILITIES FOR RESEARCH**

SHIELDED AREA, fixed 210 m<sup>2</sup> ; movable 915 m<sup>2</sup>

TARGET STATIONS 6 in rooms 5

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type QDDQ (BIG KARL)

COMPUTER model PDP11, VAX11/780

OTHER FACILITIES Scattering chambers; In-beam nucl. spectr.

equipment Bent-crystal spectrom.; Orange type β-spectrom.;

Facilities for isotope production and chemistry

**CHARACTERISTIC BEAMS**

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
p, d, $\tau, \alpha$	22.5-45 MeV/A		up to 10	
N <sup>6+</sup>		403		0.300
Ne <sup>8+</sup>		505		0.325
S <sup>13+</sup>		1020		0.006

SECONDARY (part/s)

**BEAM PROPERTIES**

MEASURED CONDITIONS  
 PULSE WIDTH 14 RF deg FWHM μA of MeV ions  
 PHASE EXC, max RF deg μA of MeV ions  
 EXTRACT eff 60. % μA of MeV ions  
 RESOL ΔE/E 0.3. % FWHM μA of MeV ions  
 EMITTANCE  
 (π mm. mrad) { 6.4 axial } μA of MeV ions  
 { 3.2 rad }

**OPERATING PROGRAMS, time distribution**  
 BASIC NUCLEAR PHYSICS .. SOLID STATES PHYSICS ....  
 BIOMEDICAL APPLICAT. .... ISOTOPE PRODUCTIONS ....

REFERENCES/NOTES  
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**PLAN VIEW OF FACILITY**

