

Entry: **C 25**
Machine Name: JULIC
Address: Forschungszentrum Jülich GmbH, Postfach 19913, D-52425 JÜLICH, Germany
In Charge of the Cyclotron: Werner Bräutigam
Tel: +49 2461 6353
Fax: +49 2461 2854

Date: June 1998
Institution: Institut für Kernphysik
Web: www.kfa-juelich.de/ikp/
E-mail: w.braeutigam@fz-juelich.de

HISTORY

Design by: AEG Großwelzheim
Construction time: 1966-1968
First beam: internal 1968, external 1969

CHARACTERISTIC BEAMS

ions / energy (MeV/n) / current (pps) / power (W) :
 - H₂⁺ 22.5 - 45 / ~ 6 · 10¹³ pps⁻¹
 - H⁺ 22.5 - 45 / ~ 6 · 10¹³ pps⁻¹
 - pol. H⁺ 22.5 - 45
 - (D⁺ polarized and unpolarized in preparation)
transmission efficiency (total)
 - **typical:** for H⁺ ~ 6 % - **best:** for H₂⁺ ~ 16 %
transverse emittance (rms)
 - **vertical:** 6.4 π mmmrad
 - **horizontal:** 3.2 π mmmrad
longitudinal emittance (rms) 0.3 % ΔE/E.deg RF

USES

basic research: 97 % **therapy:** %
development: 0.5 % **isotope production:** 0.5 %
other applications: % **maintenance:** 1.5 %
beam tuning: 0.5 %
total time: ~7500 h/year

TECHNICAL DATA

a) magnet
type: compact
Kb: 180 MeV/A **Kf:** MeV/A
average field (min-max): 0.95 - 1.35 T
number of magnet sectors: 3
 - **angle:** 60 deg
 - **spiral (max):** 20 deg
pole parameters
 - **diameter:** 3.3 m
 - **injection radius:** m
 - **extraction radius:** 1.54 m
hill gap: 0.084 m **valley gap:** 0.24 m
field trimming
 - **trim coils**
 - **number:** 9
 - **current (max):** 120 A
 - **harmonic coils**
 - **number:** -
 - **current (max):** - A
 - **others**
 - **number:** -
 - **current (max):** - A
main coils:
 - **number:** 1
 - **Ampere-turns:** 150 000 A.T.
 - **current:** 360 A
stored energy: MJ
weight : - iron: 800 t - coils: 12 t
power
 - **main coils (total):** 50 kW
 - **trim coils (total max):** 12 kW
 - **refrigerator (cryogenic):** kW

b) RF

- acceleration
 - **frequency range:** 20 - 30 MHz
 - **harmonic modes:** 3
 - **number of dees:** 3
 - **angular aperture:** 40 deg
 - **voltage: - average (min-max):** 7 - 30 kV
 - **- variation with radius**
 - **power in (max):** 100 kW
 - **stability: - phase:** < 1 deg - **voltage:** < 0.05 %

- other cavities

- **purpose:**
 - **frequency range:** MHz
 - **region of influence:** m
 - **voltage (max):** kV
 - **power in (max):** kW
 - **stability:- phase:** deg - **voltage:** %

c) injection

- **internal source:**
 - **external (radial/axial):** axial
 - **elements:** hyperboloidindeflector
 - **source voltage:** 4.5 - 9 kV
 - **injection energy:** MeV/n
 - **buncher:** double-gap - buncher, sin-voltage
 - **injection efficiency:** ~ 30 %

d) ion sources/injector

2 negative ion sources for H⁻, multi cusp type
 polarized negative ion source (pol. H⁻, D⁻)

e) extraction

- elements, characteristics:
 - electrostatic deflector
 - screening channel
 - focusing channel

- efficiency

- **typical:** for H⁻ ~ 40. % - **best:** for H₂⁺ ~ 70 %

f) vacuum

- **pumps:** 2 turbo 2200 l/s each
 3 cryo 10000 l/s each
 - **achieved vacuum:** < 2 · 10⁻⁵ Pa

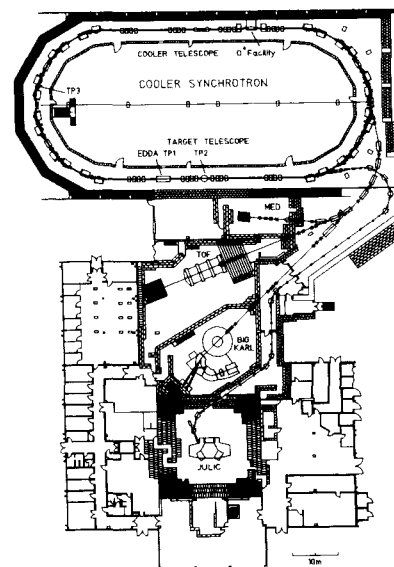
REFERENCES

- [1] W. Bräutigam et al, Proc. of the 13th Conf. on Cycl. and their App., Vancouver, Canada, 1992, pp. 67-70
- [2] R. Maier, Nucl. Instr. and Meth. A390 (1997), pp. 1-8

EXPERIMENTAL FACILITIES

Facilities for Isotope Production and Chemistry

PLAN VIEW OF FACILITY



COMMENTS

- 1) Cyclotron JULIC serves as injector for the Cooler Synchrotron COSY-Jülich