

ENTRY NO. C12 Date October 2, 1995
 Name of Machine K130 cyclotron
 Institution Department of Physics, University of Jyväskylä (JYFL)
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HISTORY

MILESTONE DATES:

Design 1988 Model Tests 1)
 Construction 1988-1990 First Beam 1992

DESIGN/CONSTRUCTION BY:

in house 1) other 1)
 COST: Accelerator ca. 7 MUSD Facility ca. 20 USD
 FUNDED BY: Government of Finland

STATUS

STAFF: Machine

Scientists 5 Engineers 4
 Technicians 3 Students 5

Research (in house/external)

Scientists 35 / 30 Engineers /
 Technicians / Students 30 /

BUDGET: Machine 1 MUSD/year Funded by Government of
 Research 2 MUSD/year Funded by Finland

TIME DISTRIBUTION:

Basic Research (in house/external) 35 % / 20 %
 Applied Program (in house/external) 5 % / 20 %
 Maintenance 10 % Development 10 %

MAGNET

POLE PARAMETERS:

Diameter 240 cm R_{extract} 94 cm R_{inject} 3 cm

HILL PARAMETERS: Gap (min) 17.4 cm B_{max} 2.12 T
 (@ 400,000 AT) Gap (max) 17.4 cm B_{min} T

VALLEY PARAMETERS: Gap (min) 33 cm B_{max} T
 (@ 400,000 AT) Gap (max) 33 cm B_{min} 1.26 T

AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ 0.35 T $\langle B \rangle_{\text{max}}$ 1.77 T

NUMBER OF SECTORS: compact/separated 3 /
 sector angle 51-81 deg. spiral (max) 58 deg.

FIELD TRIMMING: Trim Coils 15
 Harmonic Coils 4 sets in valleys
 Other

CURRENT: Main Coils 1000 Amps Stability 10^{-5}
 Trim Coils 70-90 Amps Stability

Stored Energy (cryogenic)

WEIGHT: Iron 308 tons Conductor 15 tons

ION ENERGY: Bending Limit $E/A = 130 \text{ q}^2/A^2 \text{ MeV/u}$
 Focusing Limit $E/A = 90 \text{ q/A MeV/u}$

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: $\lambda/4$ resonator, 2 dees
 No. of Gaps/turn 4 $dE/dn(\text{max})$ 0.195 MeV/q
 Voltage (max) 0.05 MV Harmonic f_r/f_{ion} 1, 2, 3
 Freq 10-21 MHz Power in(max) 0.2 MW
 Stability: Phase Voltage

OTHER CAVITIES (Flattopping or otherwise):

Description:
 Region of Influence: R_{min} cm R_{max} cm
 No. of Gaps/turn $dE/dn(\text{max})$ MeV/q
 Voltage (max) MV Harmonic f_r/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 10^{-7} mbar

PUMPS: (No. and type) 2 cryo pumps
 5000 l/s (for nitrogen)

ION SOURCE(S)

Type	Intensity (mA)	@ $\varepsilon_n = \beta\gamma\varepsilon$ ($\pi \text{ mm mrad}$)	Ion Species
(a) Multicusp	3		H, He
(b) ECR	1		gaseous +
(c)			C, Cr, Fe
(d)			Ni (MIVOC)

INJECTION SYSTEM

Axial, spiral inflector buncher Efficiency %

EXTRACTION SYSTEM

Electrostatic defl + EMC + Efficiency 50-90 %
 2 passive channels

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)	
		Internal	External
(a) p	20 - 75	20	10
(b) H ⁺ (up to	4 - 20		
(c) Kr)			
(d)			

Secondary Particles	E (MeV)	part/sec
(a)		
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:

For 1 μA of 6.0 MeV/u 16.4^+ ions
 $\Delta E/E$ 0.5 % $\Delta\phi$ 40 °rf
 $\varepsilon_n = \beta\gamma\varepsilon$ x $\pi \text{ mm mrad}$ z $\pi \text{ mm mrad}$

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: m^2 Moveable 425 m^2

Target Stations: 8 No. Served At Same Time: 1

MAGNETIC SPECTROMETERS: gas filled recoil separator

OTHER FACILITIES:
 on-line mass separator, gamma, electron and neutron
 spectrometers, 1.5 m scattering chamber

REFERENCES/NOTES

(a) 1) Magnet design by JYFL, design and construction
 by Scanditronix AB, Sweden

PLAN VIEW OF FACILITY, COMMENTS

WWW: <http://arje.jyu.fi/JYFLWeb/JYFL.html>

