

ENTRY NO: C-40
Machine Name: PSI Philips Cyclotron "Injector 1"
Date: 6/6/01 11:17:55 AM
Institution: Paul Scherrer Institute
Address CH-5232 Villigen PSI, Switzerland
In Charge of Cyclotron: Pierre A. Schmelzbach
Telephone: ++41-56-310 40 73
Fax: ++41-56-310 40 73
Person Reporting: Pierre A. Schmelzbach
Web: www.psi.ch
E-mail: Pierre.Schmelzbach@psi.ch

HISTORY

Designed By: Philips, Eindhoven, NL
Construction Dates: 1970-1973
First Beam Date: 1974

CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)/current(pps)/power(w)
p	72 200 muA
p,d	var
pol p, d	var <12 muA
Heavy Ions	2-30

transmission efficiency(source to extract beam)

typical: % - **best:** 93%

transverse emittance

emittance definition: rms

vertical: 2π mm mrad

horizontal: 3π mm mrad

longitudinal: $0.5(\Delta) E/E$ %xdeg RF

USES

basic research: 50% **therapy:** 10%
development: 10% **isotope production:** %
other: 10% **maintenance:** 10%
beam tuning: 10% **Total Time:** 6700h/year

TECHNICAL DATA

a)magnet: **type:** H-Magnet with spiral shim

Kb: 135MeV/A **Kf:** 135MeV/A

average field (min/max): 1.65 T

number of magnet sectors: 4

hill angular width: hill angular width

spiral (max): 55 deg

pole parameters

diameter: 2.5 m

injection radius: m

extraction radius: 1.05 m

hill gap: 0.24m **valley gap:** 0.45m

trim coils

-number: 12x2

-current(max): 250 A A-turns

harmonic coils

-number: 4xNsectorsx2

-current(max): 200 A A-turns

main coils

number: 1x2

total ampere-turns: 1.5e5 A-turns

current: 700 A

stored energy: MJ

weight - iron: 470t **coils:** 20t

power

main coils (total): kW

trim coils (total max): kW

refrigerator (cryogenic): kW

b)RF

acceleration

frequency range: 4.6-17, 50.633MHz

harmonic modes: 1, 3
number of dees: 1
number of cavities:
dee angular width: 180degrees
voltage
at injection: av 20-100kV(peak to ground, max)
at extraction: kV(peak to ground, max)
peak: kV(peak to ground, max)

line power(max): 100kW

stability

phase: 0.1-1 deg

voltage: 0.01-1%

injection

c)ion source: Livingston

external injection: axial

components: pol.IS, ECRIS, e.m. quads, spherical deflector, buncher, electrostat. mirror

source bias voltage: < 14kV

injection energy: < 0.1MeV/N

buncher: sine, 2-gap

injection efficiency: < 25%

d)injector:

e)extraction

electrostatic extraction channel electromagnetic extraction channel

efficiency

typical: %

best: 93%

f)vacuum

pumps: Diffusion pumps + Kryo 77 / 24 K

achieved vacuum: 5e-5Pa

REFERENCES

B.Baan et al. IEEE Tr, NS-20,3(1973)257 N.Hazewindus, Nucl Instr Meth.,129(1975)325/331 I.M. van Niewland et al. Nucl Instr Meth.,142(1977)339 P.Sigg, Nucl Instr Meth.,155(1978)1 G.Heidenreich et al.,9th Int Cycl Conf, Caen F (1981)365 P.A. Schmelzbach et al., EPAC, Rome (1988) P.A. Schmelzbach et al., 14th Int Cycl Conf, Cape Town(1995)404

EXPERIMENTAL FACILITIES

n-production target, spin rotators, gas-jet targets, crystal-spectrometers, OPTIS eye cancer treatment

COMMENTS

