

Entry: **C 58**

Machine Name: PSI Philips Cyclotron „Injector 1“

Address: Paul Scherrer Institute, CH - 5232 Villigen-PSI, Switzerland

In Charge of the cyclotron: Dr. Thomas Stammach, Dr. Pierre-Andre Schmelzbach

Tel: 41 56 310 40 73

Fax: 41 56 310 33 83

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Institution: Paul Scherrer Institute

Web: www.psi.ch

E-mail: schmelzbach@psi.ch

HISTORY

Design by: Philips, Eindhoven. NL

Construction time: 1970 - 1973

First beam: Jan 1st 1974

CHARACTERISTIC BEAMS

ions / energy (MeV/n) / current (pps) / power (W) :

- p, 72 MeV, 200 muA (<12 muA polarized)
- ECRIS, 2-30 MeV/n

transmission efficiency (total)

- typical: - best : 93%

transverse emittance (rms)

- vertical: 2π mmmrad
- horizontal: 3π mmmrad

longitudinal emittance (rms) 0.5% * <15deg ΔE/E.deg RF

USES

basic research: 63 % therapy: (72MeV p) 8 %
 development: 4 % isotope production: 6 %
 other applications: % maintenance: 9 %
 beam tuning: 10 %
 total time: 6700 h/year

TECHNICAL DATA

a) magnet

type: H-magnet with spiral shim

Kb: 135 MeV/A Kf: 135/72 MeV/A

average field (min-max): 1.65 T

number of magnet sectors: 4

- angle:
- spiral (max): 55 deg

pole parameters

- diameter: 2.5 m
- injection radius:
- extraction radius: 1.05 m

hill gap: 0.24 m valley gap: 0.45 m

field trimming

- trim coils
 - number: 12
 - current (max): 250 A
- harmonic coils
 - number: 4
 - current (max): 200 A
- others
 - number:
 - current (max):

main coils:

- number: 1 pair
- Ampere-turns: 1.5e5 A.T.
- current: <700 A

stored energy:

weight : - iron: 470 t - coils: 20t, Al

power

- main coils (total): kW
- trim coils (total max): kW
- refrigerator (cryogenic):

b) RF

- acceleration

- frequency range: 4.6 to 17, and 50.633 MHz
- harmonic modes: 1st and 3rd
- number of dees: 1
- angular aperture: 180 deg
- voltage:- average (min-max): 50 - 100 kV
 - variation with radius: none
- power in (max): 100 kW
- stability: - phase: 0.1 - 1 deg - voltage: 0.01 - 1 %

- other cavities

- purpose:
- frequency range:
- region of influence:
- voltage (max):
- power in (max):
- stability:- phase:
- voltage:

c) injection

- internal source: Livingston
- external (radial/axial): axial injection
 - elements: e.m. quads, spherical deflector, buncher electrostatic mirror
 - source voltage: 14 kV
 - injection energy: 0.1 MeV/n
 - buncher: 1

- injection efficiency:

d) ion sources/injector

Internal Livingston; External atomic beam polarized, p,d ECR „Caprice“ 1 T, 10 GHz heavy ion source, He - Pb

e) extraction

- elements, characteristics:

- electrostatic extraction channel
- electromagnetic extraction channel

- efficiency

- typical: best: 93%

f) vacuum

- pumps:
- achieved vacuum:

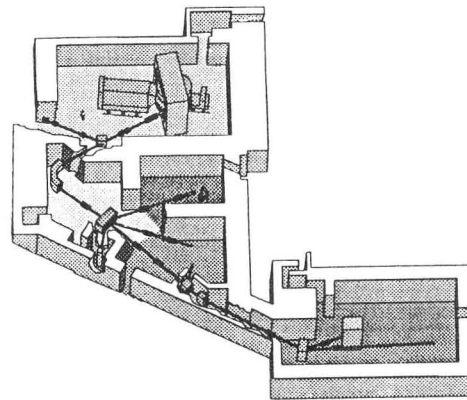
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EXPERIMENTAL FACILITIES

n-production targets, spin rotators,
 users owned/operated devices: crystal. spectrometer,
 4 Pi scattering chambers, double scattering apparatus,
 spectrometers, biological vertical beam, isotope production
 OPTIS eye cancer treatment

PLAN VIEW OF FACILITY



COMMENTS