

ENTRY NO:C36

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Machine Name: VINCY Cyclotron, within TESLA Accelerator Installation

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History

Designed by: Laboratory of Physics, Vinca Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro, and Flerov Laboratory of Nuclear Reactions, Joint Institute for Nuclear Research, Dubna, Russia

Construction Dates: September 1992 - June 1998, January 2005 - June 2006

First Beam Date: June 30, 2006

Characteristic Beams

15 MeV H+,

65 MeV H+,

30 MeV H+,

28 MeV 4He²⁺,

120 MeV 40Ar¹⁵⁺

Transmission Efficiency (source to extracted beam)

Typical (%):

Best (%):

Emittance

Emittance Definition: 90 %

Vertical (pi mm mrad): 8-34 (estimated)

Horizontal (pi mm mrad): 10-38 (estimated)

Longitudinal (dE/E[%] x RF[deg.]):

USES

Basic Research (%): 20 (planned)

Development (%): 10 (planned)

Therapy (%): 10 (planned)

Isotope Production (%): 20 (planned)

Other Application (%): 10 (planned)

Maintenance (%): 15 (planned)

Beam Tuning (%): 15 (planned)

Total Time (h/year): 5,000

TECHNICAL DATA

(a)Magnet

Type: Compact

Kb (MeV): 134

Kf (MeV): 73

Average Field (min./max. T): 1.29-1.94

Number of Sectors: 4

Hill Angular Width (deg.): 42

Spiral (deg.): 0

Pole Diameter (m): 2

Injection Radius (m): 0.033

Extraction Radius (m): 0.84

Hill Gap (m): 0.036

Valley Gap (m): 0.19

Trim Coils

Number: 2 X 10

Maximum Current (A-turns): 48,600 (maximum current is 300 A)

Harmonic Coils

Number: 2 X (4+4)

Maximum Current (A-turns): 12,000 (maximum current is 300 A)

Main Coils

Number: 2

Total Ampere Turns: 512,000

Maximum Current (A): 1,000 A

Stored Energy (MJ):

Total Iron Weight (tons): 240.3

Total Coil Weight (tons): 22.5

Power

Main Coils (total KW): 131

Trim Coils (total, maximum, KW): 36

Refrigerator (cryogenic, KW):

(b)RF

Acceleration

Frequency Range (MHz): 17-31

Harmonic Modes: 1, 2 and 4

Number of Dees: 2

Number of Cavities: 2

Dee Angular Width (deg.): 34 (average)

Voltage

At Injection (peak to ground, KV): 100

At Extraction (peak to ground, KV): 96.3-88.5

Peak (peak to ground, KV): 100

Line Power (max, KW): 50

Phase Stability (deg.): 0.5

Voltage Stability (%): 0.05

(c)Injection

Ion Source: Volume positive or negative light ion source (pVINIS) or electron cyclotron resonance heavy ion source (nVINIS)

Source Bias Voltage (kV): 40 kV for pVINIS and 25 kV for nVINIS

External Injection: Axial

Buncher Type: Two-grid sinusoidal

Injection Energy (MeV/n): 0.002-0.025 (pVINIS and nVINIS)

Component: Spiral inflector

Injection Efficiency (%):

Injector:

(d)Extraction

Elements, Characteristic: Back foil stripping system, front foil stripping system or electrostatic deflection system

Typical Efficiency (%):

Best Efficiency (%):

(e)Vacuum

Pumps: Two 10,000 l/s cryopumps, four 920 l/s turbopumps and one 210 l/s turbopump

Achieved Vacuum (Pa): 3X10⁻⁵ (estimated)

REFERENCES N. Neskovic et al., Nukleonika, Suppl. 2 (2003) S135

EXPERIMENTAL FACILITIES

First experimental set-ups: target station for routine production of radionuclide ¹⁸F, solid target irradiation system for experimental production of radionuclides, and irradiation system for biological samples

COMMENTS