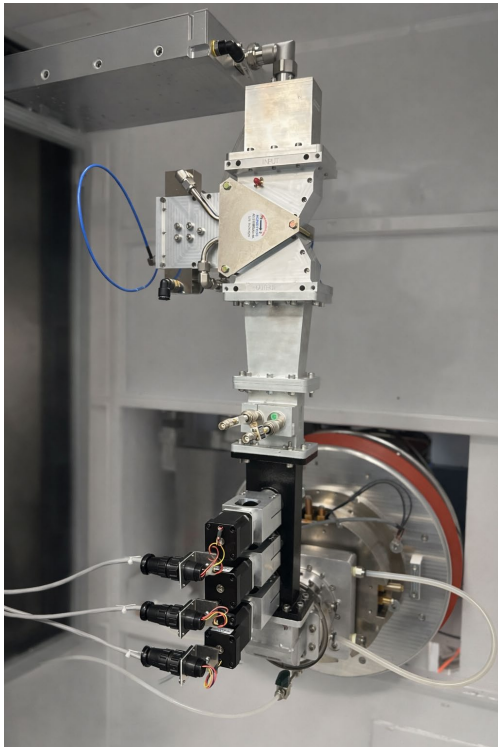


2.45 GHz ECR ION SOURCE

IS.ECR-010

Neutron Therapeutics-licensed¹ electron cyclotron resonance ion source.

- High current ion source for monocharged ions
- Three solenoid configuration enables fine tuning of magnetic field and plasma confinement
- Moveable extractor for wide beam energy range (40-60 keV)



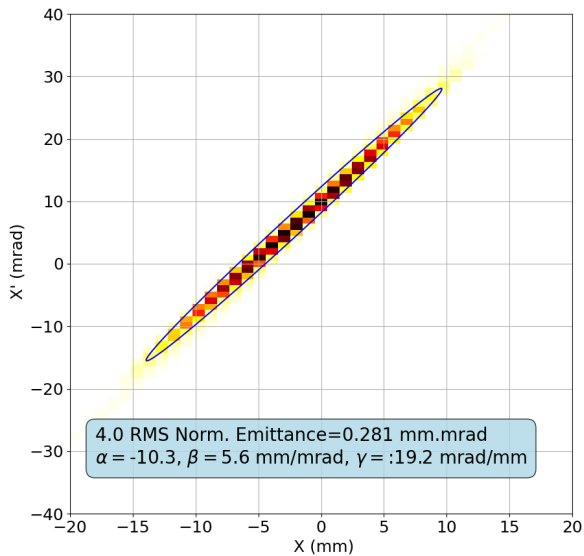
ECR Ion Source (IS.ECR-010)

ION	Maximum Beam Current (mA)	Beam Energy (keV)
H ⁺	30	40-60
H ₂ ⁺	5	40-60
D ⁺	30 (est.) ²	40-60
He ⁺	30	40-60
Kr ⁺	5	40-60

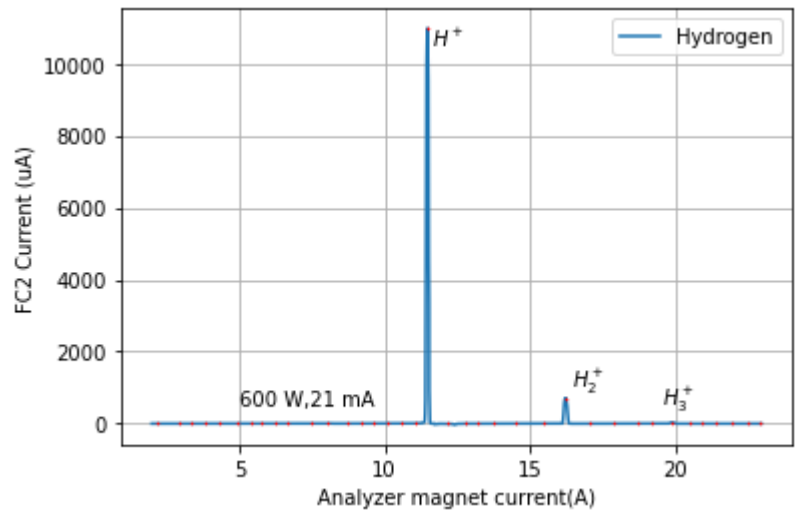
Commercially Available Ions, Currents, and Kinetic Energies. Maximum beam currents are achieved using different ion source configurations for different species.

SPECIFICATION: IS.ECR-010	
ION SOURCE CHARACTERISTICS	
Particle Types	H ⁺ , H ₂ ⁺ , He ⁺ , D ⁺ , Kr and most gaseous ions
Frequency	2.4-2.5 GHz
Beam Current Stability	± 1% over 24 hours
EMITTANCE CHARACTERISTICS FOR H ⁺ (60 keV)	
Geometric Emittance (1RMS)	< 10 mm·mrad
Normalized Emittance (1RMS)	< 0.15 mm·mrad
Distribution	Gaussian
POWER SUPPLIES	
Microwave Generator	50 VDC, 1.6 kW
Max Bias Supply	125 mA, 80 kV
Suppression System	12 mA, 5 kV
Solenoid (3x)	110 A, 6.9 V
VACUUM SYSTEM SPECIFICATIONS	
Turbo Pump	2300 l/s Flange ISO250F
Roughing Pump	36 m ³ /hr
GAS FLOW	
Mass Flow Controller	0-3 sccm of H ₂
CONTROLS	
Control PLC	PLC, Ethernet Interface
User Interface Options	D-Pace standalone or OPC command library for customer integration
High Voltage Interlocks	HV grounding with access control locks
COOLING WATER, DEIONIZED, 20°C (>1.0 MOhm.cm)	
Extraction Assembly	5.0 LPM, 70 PSI (480 kPa)
Microwave generator	5.0 LPM, 50 PSI (345 kPa)
Plasma Chamber	6.0 LPM, 70 PSI (480 kPa)
Waveguide	6.0 LPM, 70 PSI (480 kPa)
Heat Exchange Assembly	6.0 LPM, 70 PSI (480 kPa)
Solenoid Magnet Assembly	10 LPM, 30 PSI (205 kPa)

*All beam specifications listed are for a fully conditioned ion source system



Emittance data for 60 keV, 30 mA hydrogen beam showing 4RMS Twiss parameters



Mass spectrometer data showing beam composition of ECR beam extracted from H₂ plasma optimized for H⁺ extraction.

The IS.ECR-010 Ion Source system includes the following:

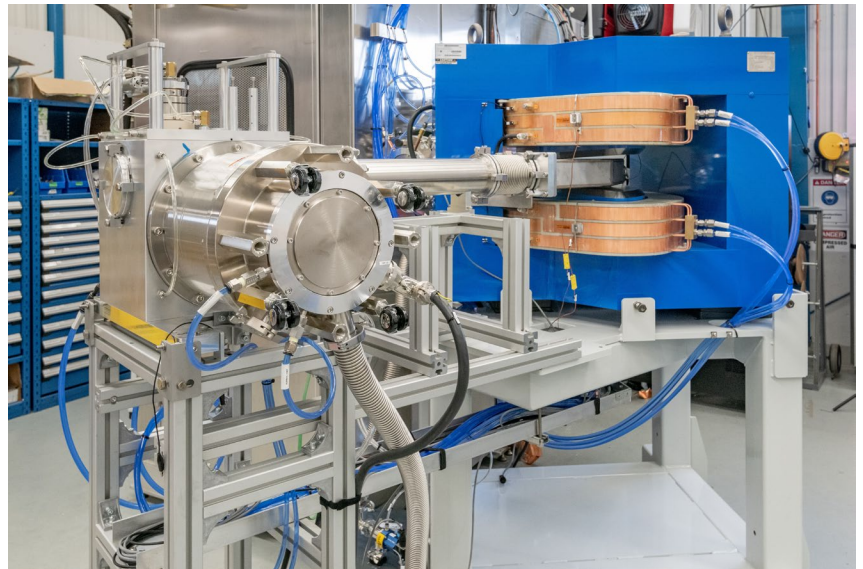
- Ion source & vacuum box
- RF amplifier & impedance matching systems

Optional: Turnkey system IS.ECR-020

- Vacuum system & gauges
- Power supplies, PLC controls & software
- Interlocks and HV grounding system
- User interface & Ethernet-based remote controls
- Water flow gauges and interlocks
- Mass flow controller for feed gasses
- Mass spectrometer with resolution slits
- High-voltage enclosure/ion source stand
- Water de-ionization and cooling system
- Retractable Faraday cup
- Personnel access control interlocks

Optional add-ons to Turnkey system IS.ECR-020

- Additional LEPT components
- Steering, solenoid/quadrupole focusing system downstream of source
- TRIUMF licenced Allison-type emittance scanner
- UniBEaM fiber optic beam profile monitor or scanning slit beam profiler



ECR Ion Source Turnkey System (IS.ECR-020)

Enquire about other ion beams from this source.

1. ECR technology is licenced from Neutron Therapeutics
2. Estimate - Unable to measure due to neutrons released from D-D reaction in Faraday Cup.