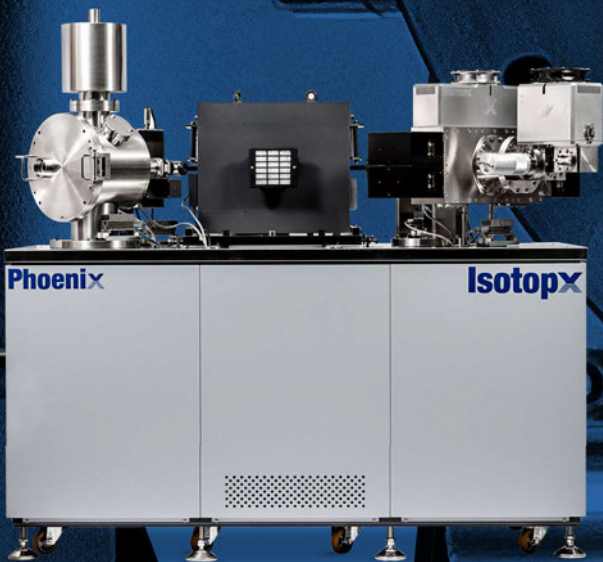


Isotopx



Phoenix TIMS

Thermal Ionization
Mass Spectrometer

isotopx.com

Excellence
in Mass
Spectrometry



Performance Without Compromise

**Isotopx has over 50 years of TIMS expertise.
Phoenix is the result.**

Advanced detector and amplification technology delivers exceptional analytical performance without practical compromise.

Phoenix supports the full range of isotope measurements alongside straightforward instrument setup, improving efficiency while maintaining the accuracy and reproducibility that high-precision isotope analysis demands.

**One instrument
Every measurement
No compromise**



Designed to Evolve

**Phoenix is a long term
investment in your science.**

Continuous development in hardware, software and detection capability means the instrument advances alongside your science.

Guided by the laboratories who use it every day, Phoenix keeps pace with where your research takes you.

Geochronology & Earth Sciences

TIMS is the benchmark technique for high-precision isotope ratio measurement in geochronology and radiogenic isotope geochemistry.

Phoenix supports the full range of earth science applications:

U-Pb geochronology Rb-Sr

Sm-Nd Lu-Hf Re-Os

U-Th-Pb Common Pb

Sr-Nd-Pb-Hf-Os tracer studies

Petrochronology

Cosmochemistry

Palaeoceanography

These measurements demand exceptional stability, low noise and reliable performance across a wide dynamic range.

Phoenix TIMS builds on this foundation with advanced amplification technology and the field-proven Daly detector, enabling precise measurement across a wide range of signal intensities.

Daly Detection and ATONA Amplification: U-Pb ID TIMS Geochronology

A study at Princeton University evaluated ATONA amplification on Phoenix TIMS for high precision U-Pb ID-TIMS geochronology across sample sizes representative of typical zircon analyses.



0.5 mV CROSSOVER THRESHOLD
At 0.5 mV (~30,000 cps) ATONA Faraday matches Daly precision



<0.6 ppm GAIN STABILITY
Stable over 9 months – weekly to monthly recalibration sufficient



<0.5 s RESPONSE TIME
Rapid baseline return after magnet jumps



Extending Faraday capability LOW SIGNAL MEASUREMENT
ATONA low noise brings major Pb and U isotopes within reach of Faraday detection at signal levels previously only accessible to ion counters – eliminating simultaneous static collection and eliminating peak-hopping corrections



aA to nA dynamic range DYNAMIC RANGE
Same performance on every channel simultaneously – no mixed amplifier arrays, no variable settling times, ideal where ²³⁸U and spike beams differ by orders of magnitude

Scan here to learn more!



You may need to pay to access the publication if you cannot access it through your institution

A cathodoluminescence (CL) image of growth zoning in a 3.9 Ga zircon from the Saglek-Hebron Complex (Labrador, Canada). Image credit: Emily E. Mixon

Daly Detection Plus ATONA® Amplification

Daly detection

Field-proven gold standard for over three decades.

Extended Faraday range

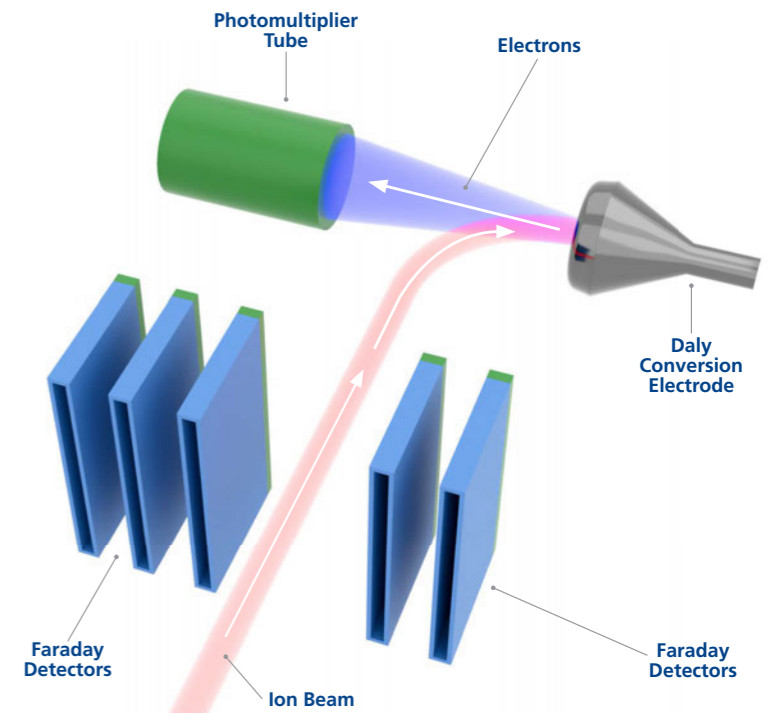
ATONA enables precise measurement of much lower intensity beams

Flexible workflows

Combine Daly for lowest signals with ATONA Faradays across a wide dynamic range

Daly + ATONA

Proven detection with extended capability



For practical purposes, the advantages of using the ATONA for U-Pb geochronology are similar to those of 10e¹³ ohm amplifiers, but with a **greater degree of flexibility in cup configuration, shorter response time, larger dynamic range and better gain stability.**

Dawid Szymanowski and Blair Schoene, J. Anal. At. Spectrom. 2020 (DOI: 10.1039/d0ja00135j)

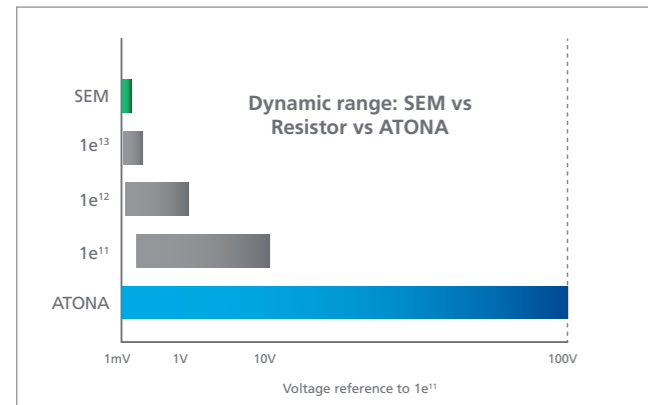


ATONA Amplification

Low noise amplification – enables precise measurement of very low-intensity ion beams, supporting high-precision data from smaller sample sizes.

Wide dynamic range (aA to nA)

Measure high- and low-abundance isotopes within a single setup, without the need for mixed amplifier configurations.



Flexible measurement strategies

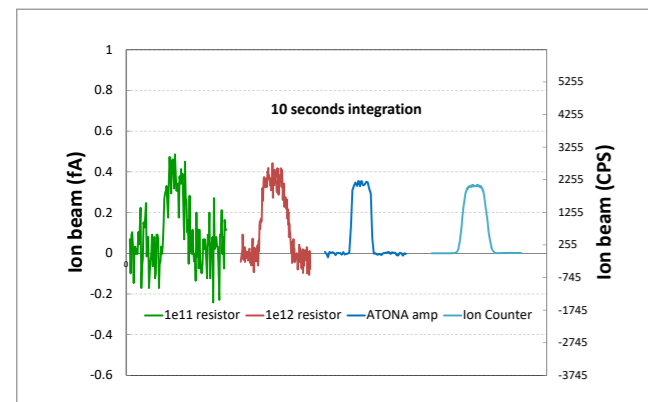
Avoids the constraints of fixed detector configurations, allowing methods to be adapted without reconfiguring the instrument.

Stable baseline performance

Maintains consistent baseline over extended periods, reducing the need for repeated baseline measurements and improving reproducibility.

Fast response time

Enables rapid signal stabilization and peak jumping, shortening analysis times and improving overall throughput.



ATONA Amplification – Sub-nanogram Nd Analysis

A study at Los Alamos National Laboratory demonstrated high-precision ¹⁴³Nd/¹⁴⁴Nd measurements on 100 pg loads of JNdi-1 using ATONA amplifiers on Phoenix TIMS – pushing the boundaries of what Faraday detection can achieve at sub-nanogram sample sizes.



23ppm

EXTERNAL REPRODUCIBILITY

¹⁴³Nd/¹⁴⁴Nd on 100 pg loads – more than a factor of 3 improvement over previously published data at the same sample size



<0.6 ppm

GAIN STABILITY

Stable over 10 months – gains can be measured less frequently and with greater accuracy, reducing calibration overhead and improving analytical efficiency. Only ATONA can do this



38% improvement

PRECISION GAIN

Simply increasing integration time from 10 s to 30 s – no hardware changes, no method reconfiguration



Static Faraday

CONFIGURATION

All nine Faraday detectors in static mode throughout – simple, reproducible workflows at the sub-nanogram level

Scan here to learn more!



Nuclear & Radiochemical Analysis

Precise isotope ratio measurement is fundamental to nuclear science. These are measurements where accuracy, stability and sensitivity are non-negotiable.

Phoenix supports the full range of nuclear and radiochemical applications:

- Safeguards & treaty verification
- Nuclear forensics
- Nuclear material accounting
- Reactor & spent fuel analysis
- Burnup measurement
- Environmental monitoring
- Plutonium fingerprinting
- Caesium isotope analysis

At the heart of many of these measurements is the need to simultaneously detect multiple isotopes at single-count, trace-level intensities. Sequential measurement on a single ion counter is simply not adequate. Phoenix Multiple Ion Counting solves this.

Multiple Ion Counting TIMS

Phoenix MIC provides an array of up to 12 independently moveable conversion dynode ion counters in the main collector block, controlled entirely via software.

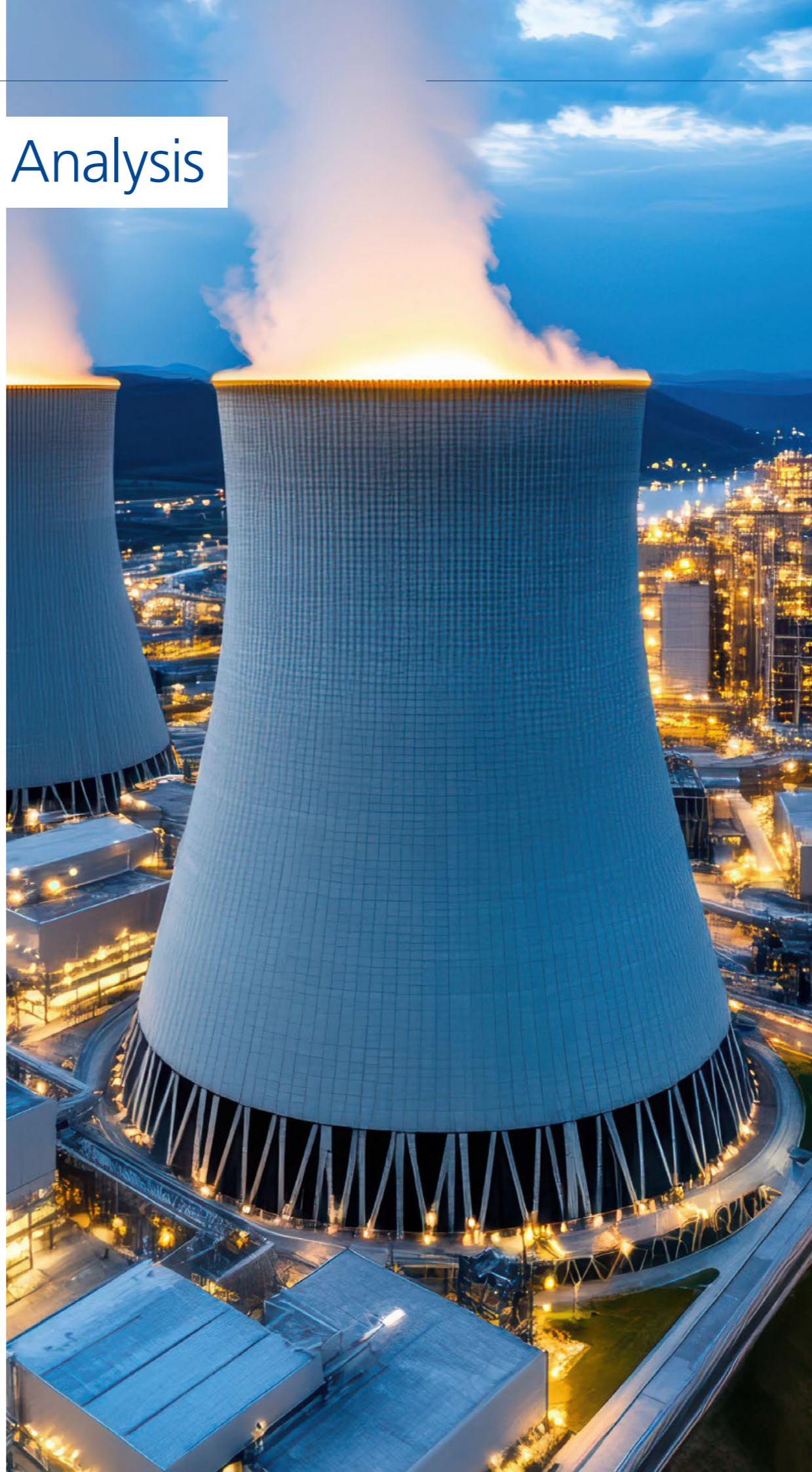
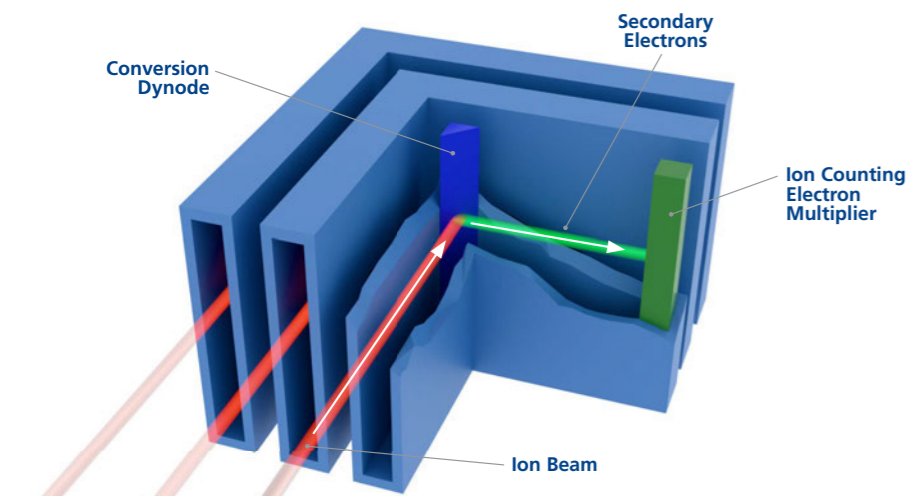
The 90 degree chimney design enables simultaneous collection of actinides at 1 amu spacing, a capability critical to trace level nuclear analysis.

MICX electronics deliver exceptional dark noise performance, linearity, peak flatness and gain stability, setting a new standard for miniaturised ion counting in TIMS.

Counters are independently moveable, making it straightforward to configure for different actinide isotope systems simply by adjusting the spacing via software.

A single ZEPTONA Faraday detector enables precise gain calibration of the ion counters at signal intensities too low for conventional Faraday detection.

1e14Ω ZEPTONA noise performance	<0.5CPM Dark noise	11 Orders of magnitude Dynamic range
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MICX Electronics – Built for Trace Actinide Analysis

Newly developed power supply and counting electronics for up to 12 independently moveable ion counters, delivering a step change in miniaturised ion counter performance across all channels.

A single ZEPTONA Faraday detector enables precise gain calibration at signal intensities too low for conventional Faraday detection.

- 
<0.5 CPM DARK NOISE
 Enables measurement of the lowest possible signals – essential for trace actinide analysis
- 
<0.1% 1RSD LINEARITY
 Up to 300 kCPS – reliable deadtime correction across the full analytical range
- 
0.06% 1RSD GAIN STABILITY
 Excellent inter-channel stability – reliable data across long analytical sessions without frequent gain recalibration
- 
<0.1% over +/- 100 ppm PEAK FLATNESS
 Eliminates apparent gain variation due to measurement position on the peak flat
- 
11 orders DYNAMIC RANGE
 Single ion detection on the MIC through to 100 V on the ZEPTONA – the full range of actinide measurement on one configuration

Scan here to learn more!



ZEPTONA Faraday Detector

An ultra-low noise single Faraday detector mounted behind the main collector array, fitted with a custom ATONA amplifier optimised for minimum noise.

Zeptona opens up measurements previously inaccessible to Faraday detection.



~10¹⁴ Ω equivalent
NOISE PERFORMANCE

~5 times lower noise than ATONA at all integration times



10 orders of magnitude
DYNAMIC RANGE

10⁻¹⁸ to 10⁻⁸ A – no hardware switching required



3.9 x 10⁻²⁰
BASELINE STABILITY

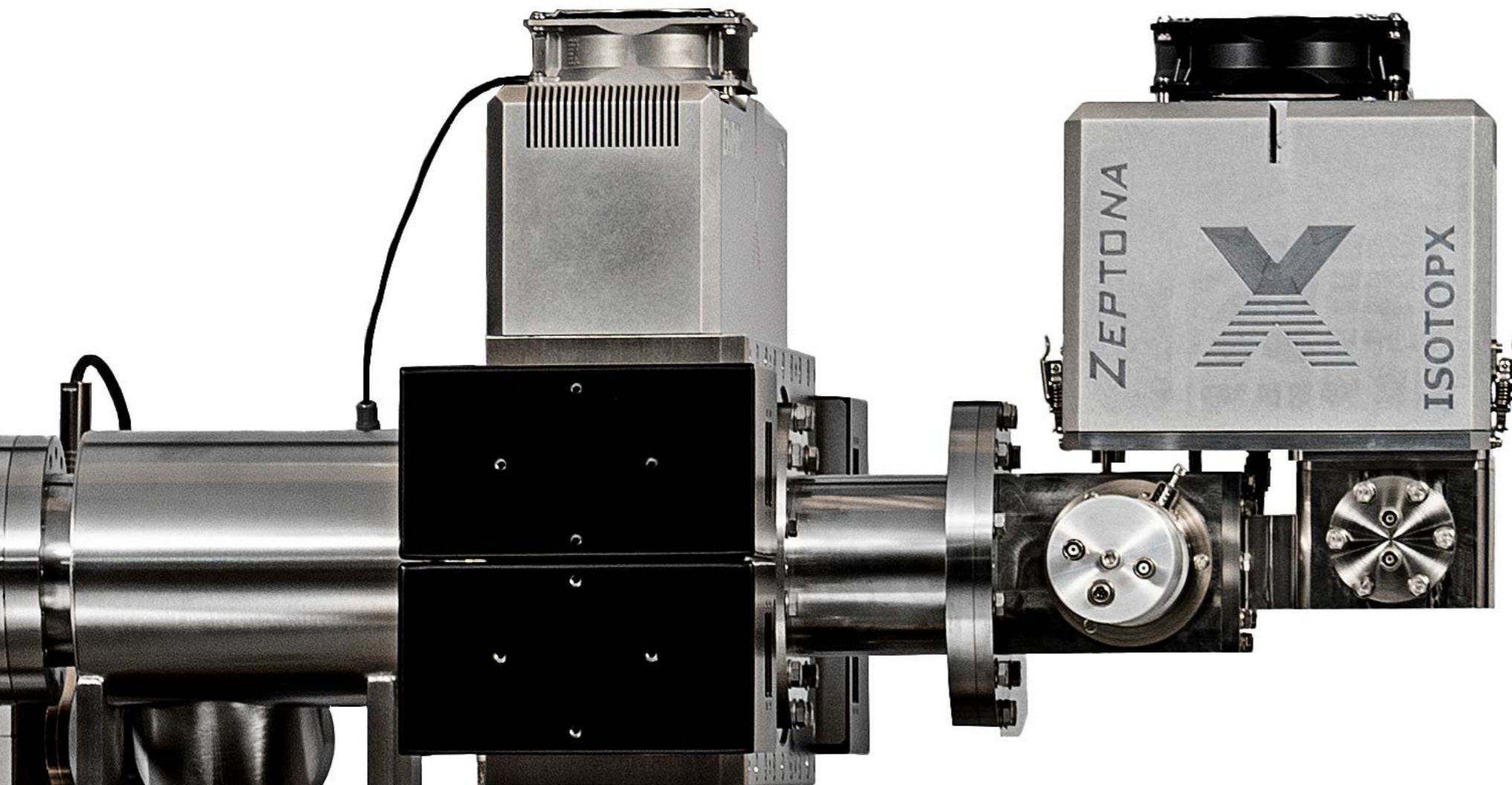
Over 7 days – no routine baseline measurements needed during analysis



Electronic baseline
EBL AUTOMATED

Ultra-high accuracy baselines measured overnight – eliminating the trade-off between baseline and on-peak time

Isotopx Technical Note TN2102 – isotopx.com/resources



Minor uranium isotope analysis

Precision measurement of ²³⁴U/²³⁸U has traditionally required ion counting for the low-abundance ²³⁴U isotope, introducing the challenges of gain calibration, deadtime correction and gain drift.

ATONA and Zeptona amplification on Phoenix TIMS enables an all-Faraday measurement - eliminating ion counting entirely.

²³⁴U/²³⁸U PRECISION – IRMM184

FARADAY/DAY – 2010
External precision 1 RSD **0.091%**

FACTOR OF 2 IMPROVEMENT ↓

ATONA/ZEPTONA – 2023
External precision 1 RSD **0.051%**

All-Faraday configuration – no ion counting, no deadtime correction, no gain drift

A UNIQUE ATONA / ZEPTONA ADVANTAGE

Noise decreases with integration time more than 3 times faster than resistor amplifiers – precision approaches counting statistics with longer integrations. Resistor amplifiers do not have this property.

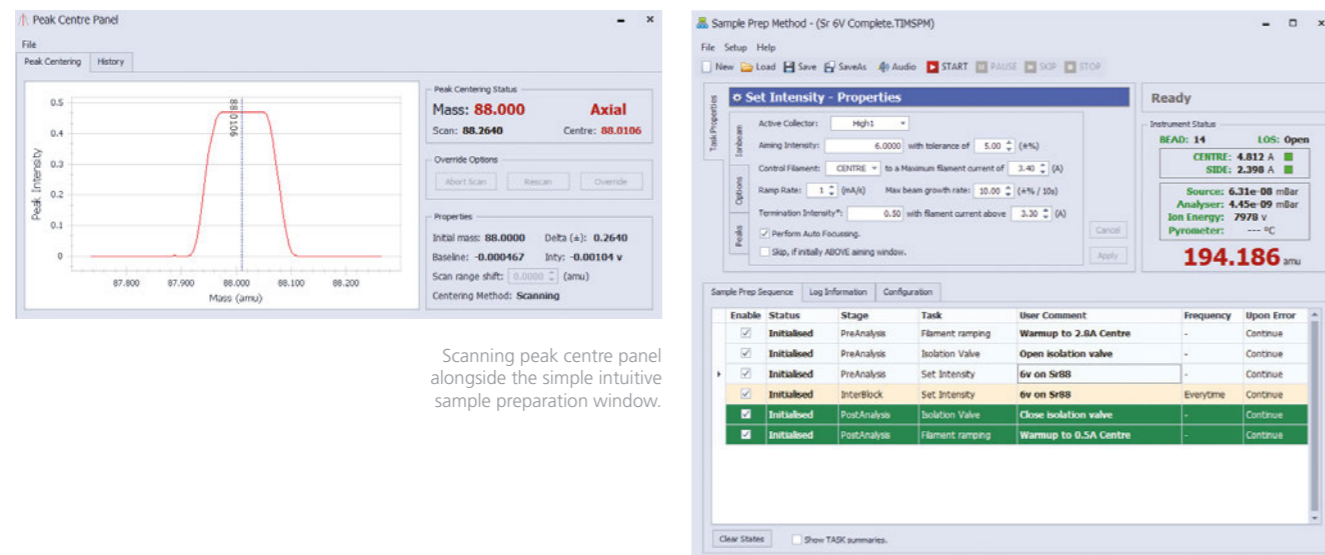
Palacz et al., Isotopx Application Note – isotopx.com/resources

Scan here to learn more!

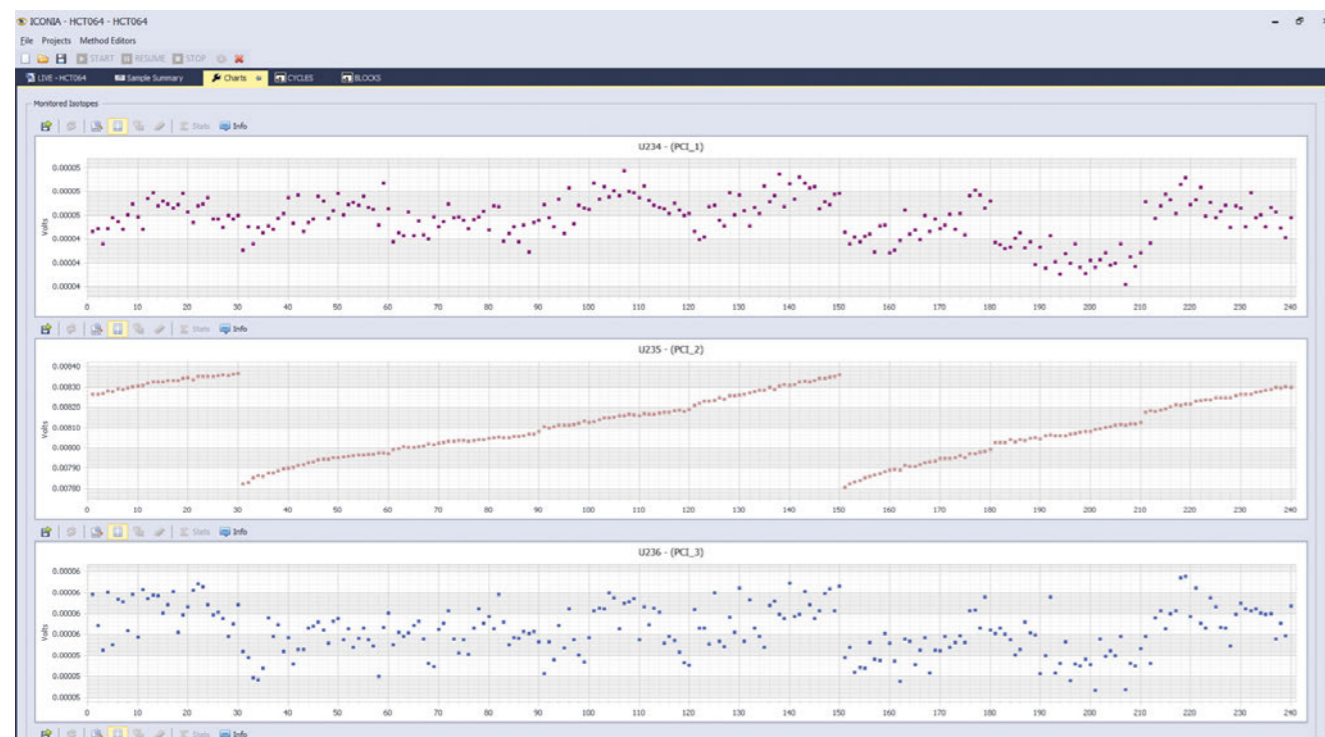


Instrument Control Software

The Phoenix control software is a fresh take on traditional mass spectrometry software. It's clearly laid out and intuitive; it has been designed to make instrument control and data acquisition as simple and efficient as possible.



Scanning peak centre panel alongside the simple intuitive sample preparation window.



The live, fully customisable/dockable data processing and charts view

The Phoenix control software is designed to make instrument control and data acquisition as simple and efficient as possible.



Single PC MODERN ARCHITECTURE

Runs on current Windows platforms – no separate onboard computer required



Total Flash Evaporation TFE INTEGRATED

Integrated beam management with adaptable filament control – fully automated TFE capability



1 mV peak scanning SIGNAL DETECTION

Robust peak centring algorithms reliably find peak centres with sub 1 mV beams, and include real time manual override



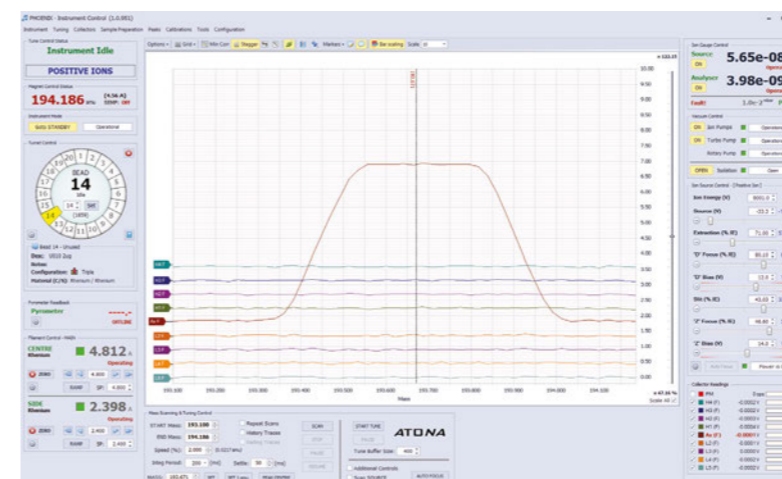
Live customisable interface DOCKABLE PANELS

Fully dockable data processing and charts view – configure your workspace in real time



Open data formats SQLITE & ASCII

All raw data stored in open SQLite files – easily exported in machine-readable ASCII formats



TIMS tuning page with all of the necessary information readily accessible

Designed to Evolve

Phoenix software is developed alongside its users.

Feedback from day-to-day operation directly informs every release – many features in the current platform originated from user requests.

Shaped by science.
Driven by you.

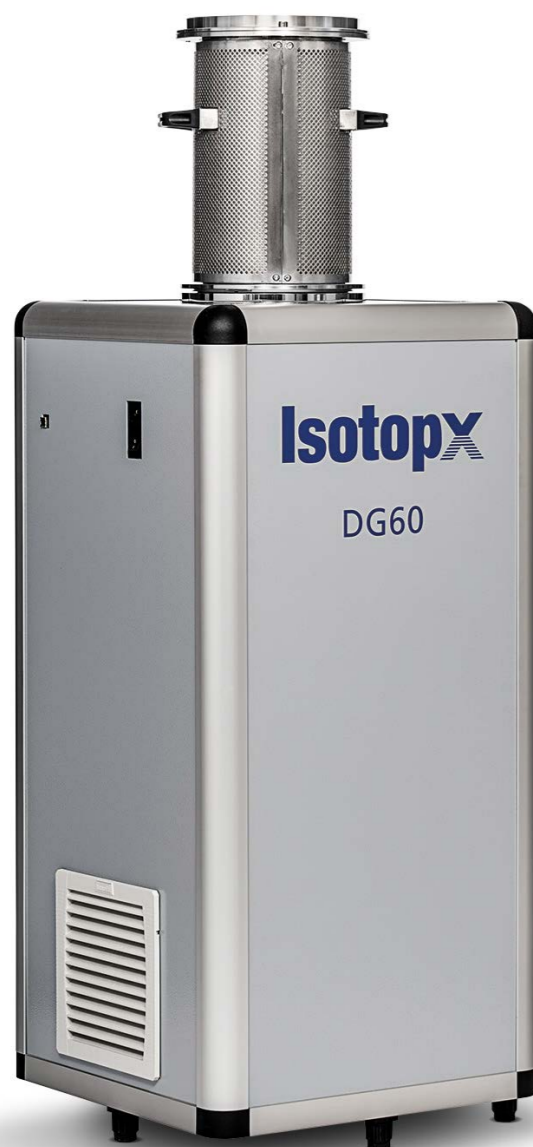


DG60 Degasser

Interested in improving your throughput?

Isotopx offer an optional fully automated degasser uniquely capable of degassing up to 60 filaments per cycle. It uses an oil-free pumping system with an air-cooled turbo pump backed by a scroll pump, ensuring clean degassing and rapid pump-down.

It's a floor standing unit with all-stainless steel vacuum enclosure and an integrated sight glass. Naturally, it is fully automated with vacuum pressure feedback and an automated gas bleed option. The DG60 uses tool-free filament loading and unloading for painless, high throughput degassing.



Scan
here to
learn
more!



Supporting you

We're dedicated to keeping your instrument performing at its best.

We rightfully have a reputation for offering the best support in the isotope ratio community, facilitated by some of the most experienced engineers in the business.

We continue to support previous-generation TIMS instruments, ensuring long-term performance and continuity. This reflects the robustness of our designs and the depth of expertise within our team.

We can supply a variety of post-warranty service plans, which can vary from simple email and telephone support to complete extended warranty support with preventative maintenance contracts.



Isotopx Ltd.

Dalton House, Dalton Way,
Middlewich, Cheshire
United Kingdom, CW10 0HU

T: +44 (0) 1606 839810
sales@isotopx.com
isotopx.com

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