



Sapphire XD

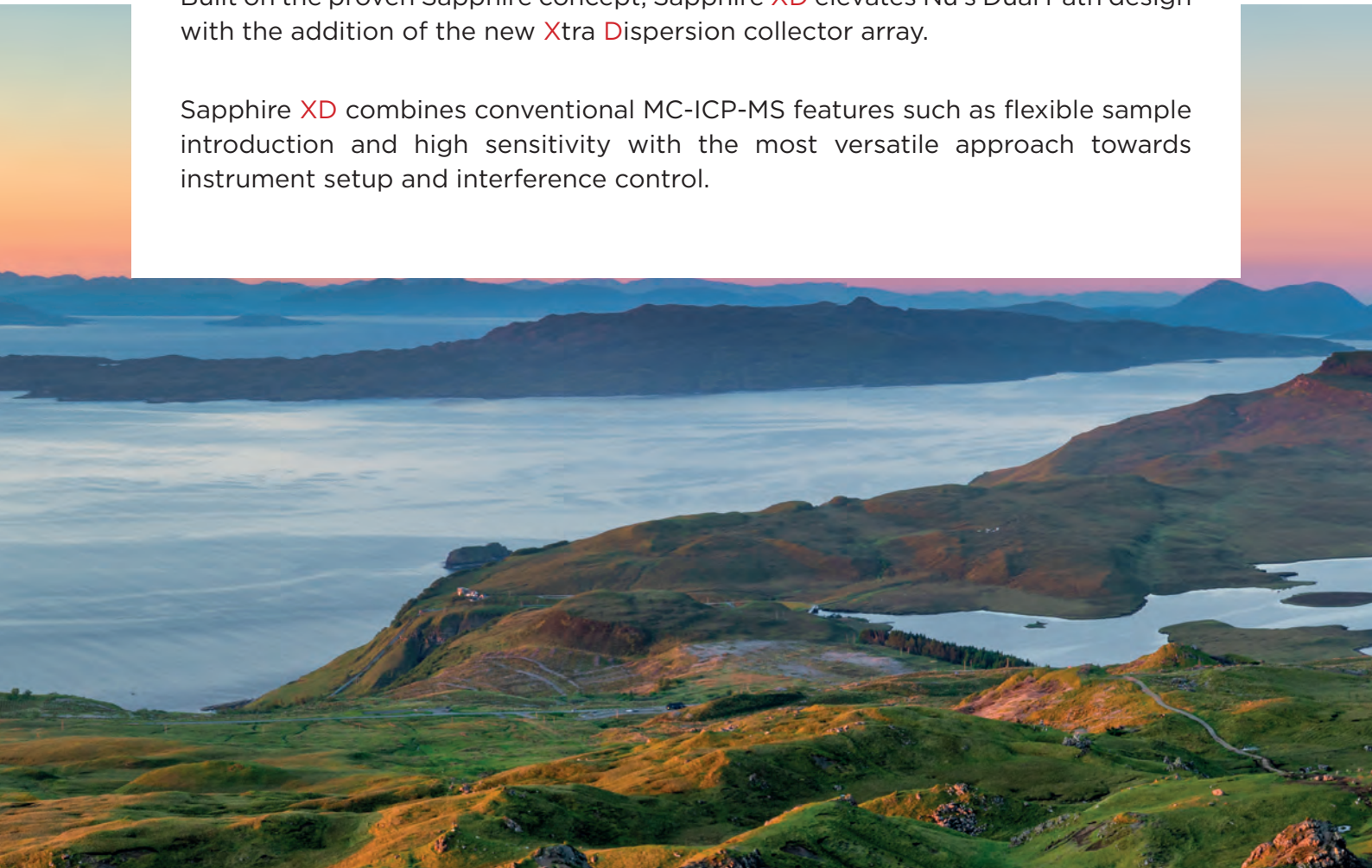
Dual Path Multi-Collector ICP-MS
with Collision/Reaction Cell

Sapphire XD

The future of Sapphire - Sapphire **XD** is the next step towards ultimate flexibility and versatility in state-of-the-art isotope abundance ratio analysis by MC-ICP-MS.

Built on the proven Sapphire concept, Sapphire **XD** elevates Nu's Dual Path design with the addition of the new **X**tra **D**ispersion collector array.

Sapphire **XD** combines conventional MC-ICP-MS features such as flexible sample introduction and high sensitivity with the most versatile approach towards instrument setup and interference control.



Key Features

Every System, Every Mode

Sapphire XD allows to select or by-pass individual features for an optimised method setup without compromise - every system, every mode - for both, routine workflows and innovative applications across disciplines.

Smaller Samples, More Information

The hexapole collision/reaction cell for chemical interference suppression via collision/reaction gases enables low resolution analysis with tenfold sensitivity gains for systems such as K, Ca, Cr, V, or Fe.

Xtra Dispersion

The new **XD** collector array offers **Xtra Dispersion** for static measurements of e.g. Si-Mg, Ca, REEs, or U-Th-Pb. With up to 28 Faraday cups and 6 ion-counting detectors measuring single ions to large ion beams.

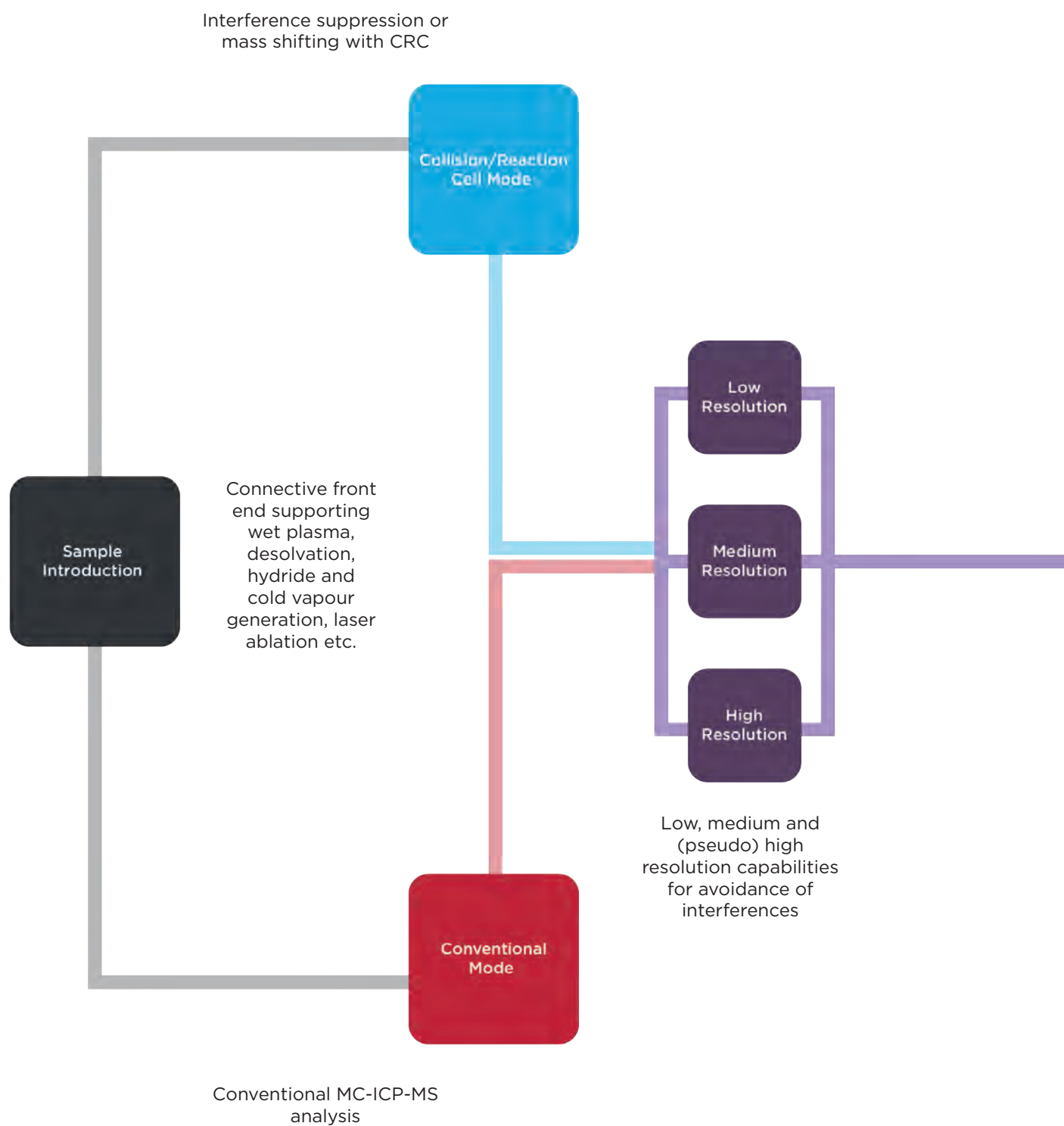
With CoDaq Software

The latest Nu Control and Data Acquisition software is now on MC-ICP-MS. A user-friendly platform that allows for creating workflows, easily integrates third-party accessories, and can utilize python-based scripts for data acquisition and reduction.



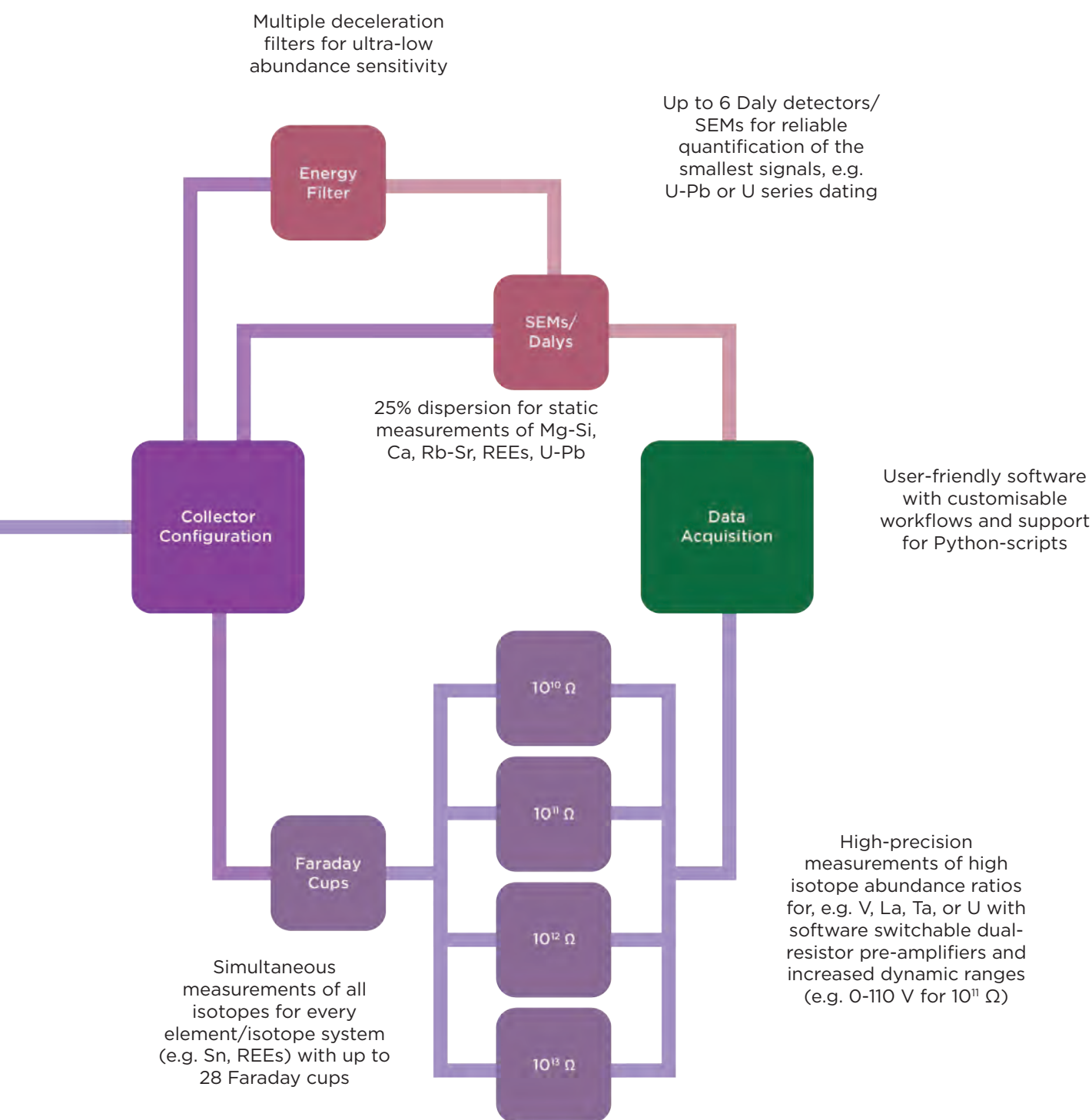
Every System...

Flexibility as a key design



...Every Mode

Optimise each analysis for ultimate performance



The Dual Path MC-ICP-MS

Linking Tradition with Novelty

Sapphire XD allows users to select or by-pass individual features for an optimised method setup without compromise - every system, every mode - for both, routine workflows and innovative applications across disciplines.

Flexible Instrument Setup

The unique Dual Path enables two main operational modes for optimised instrument setup of conventional and novel isotope systems.

Interference Removal

The hexapole collision/reaction cell for chemical interference suppression via collision/reaction gases enables low resolution analysis for > tenfold sensitivity gains for systems such as K, Ca, Cr, V, or Fe.

Traditional Isotope Systems

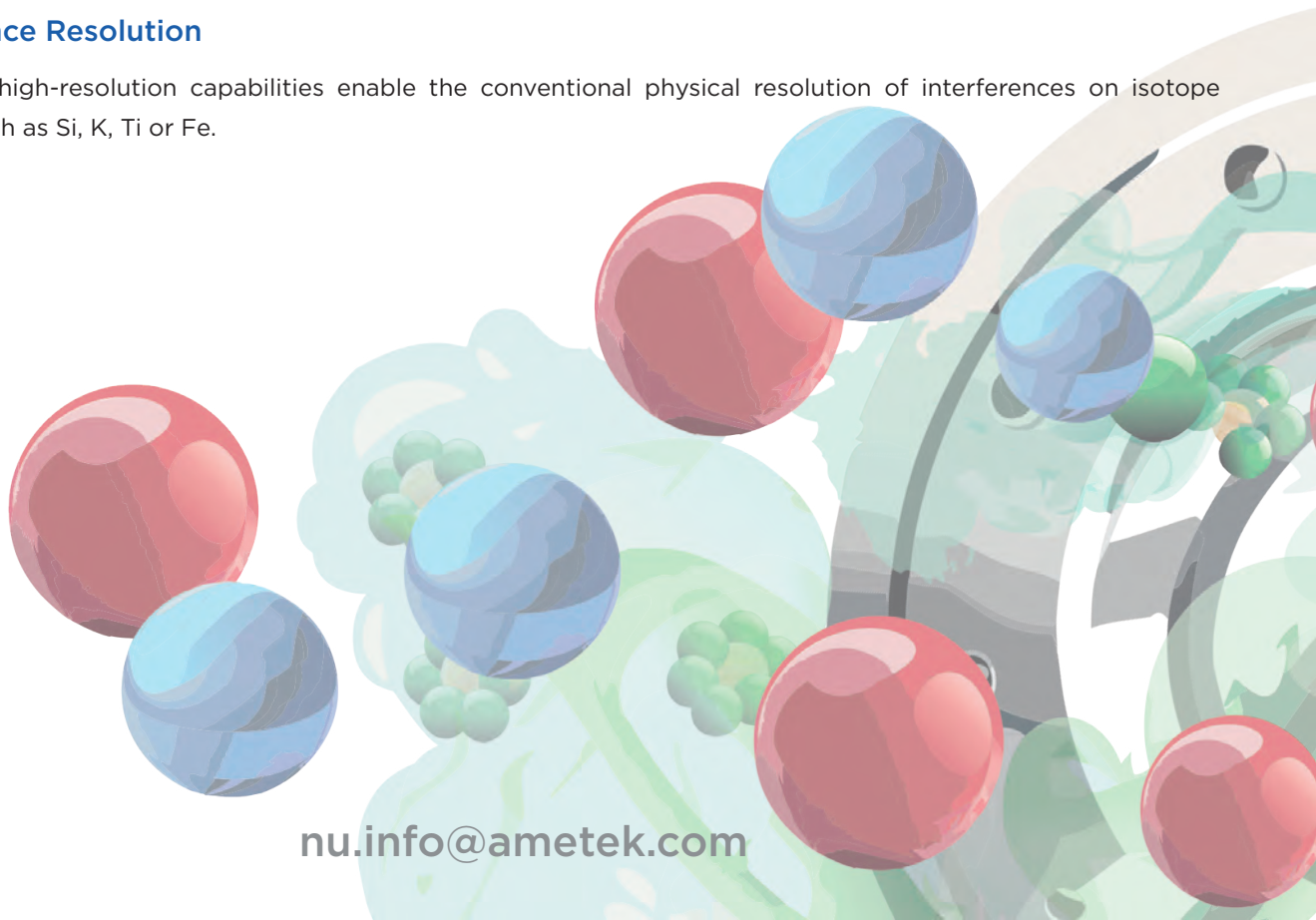
Routine high-precision and accuracy isotope ratio analysis of traditional isotope systems such as, Sr, Nd, Hf, or Pb.

Fast Setup and Switching between Isotope Systems

Reliable and reproducible ion optics and electronics in combination with a static multi-collection array allow for reloading and switching between method setups.

Interference Resolution

Adjustable high-resolution capabilities enable the conventional physical resolution of interferences on isotope systems such as Si, K, Ti or Fe.



The Nu Approach to Isotope Ratio Analysis

Sapphire first introduced the Dual Path to MC-ICP-MS in 2017 – Sapphire XD improves upon the control through the latest CoDaq software.

Analysis Modes - Redefined

Combine, bypass or switch: Choose and optimise the instrument setup with the desired capabilities - Collision/Reaction Cell, Low/Medium/High Resolution. Sapphire XD offers the flexibility to analyse each isotope system with the optimal setup.

Conventional MC-ICP-MS analysis for, e.g. Nd, Hf (Low resolution) or Fe (High resolution)



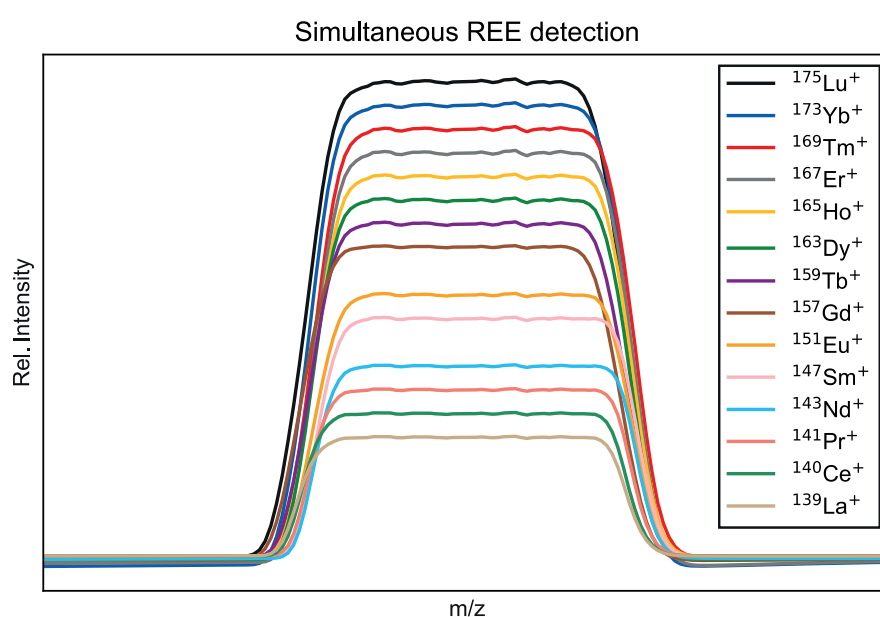
Collision/Reaction Cell analysis for, e.g. K, Ca, or Se

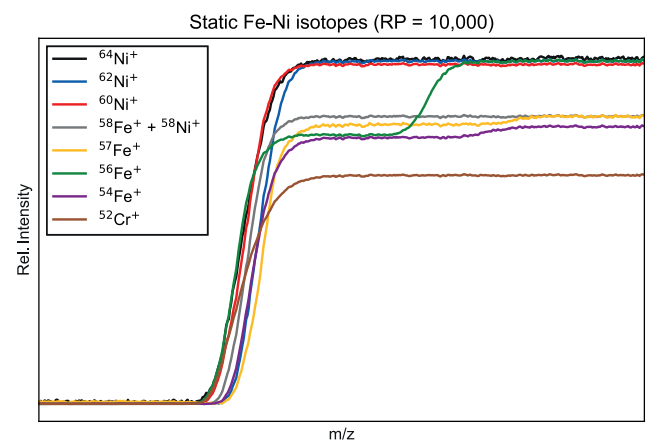
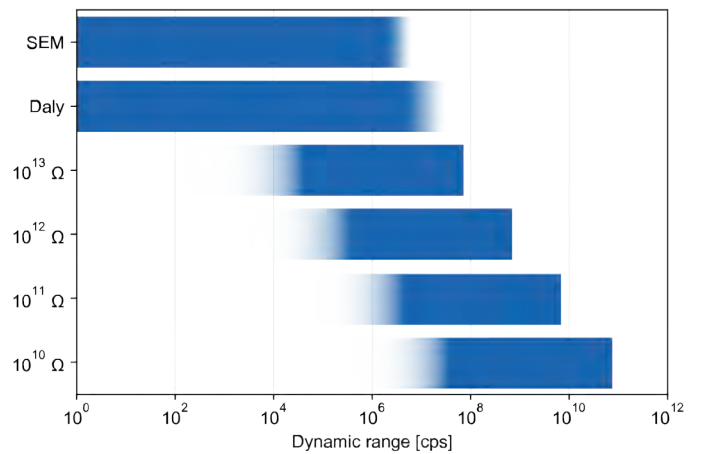
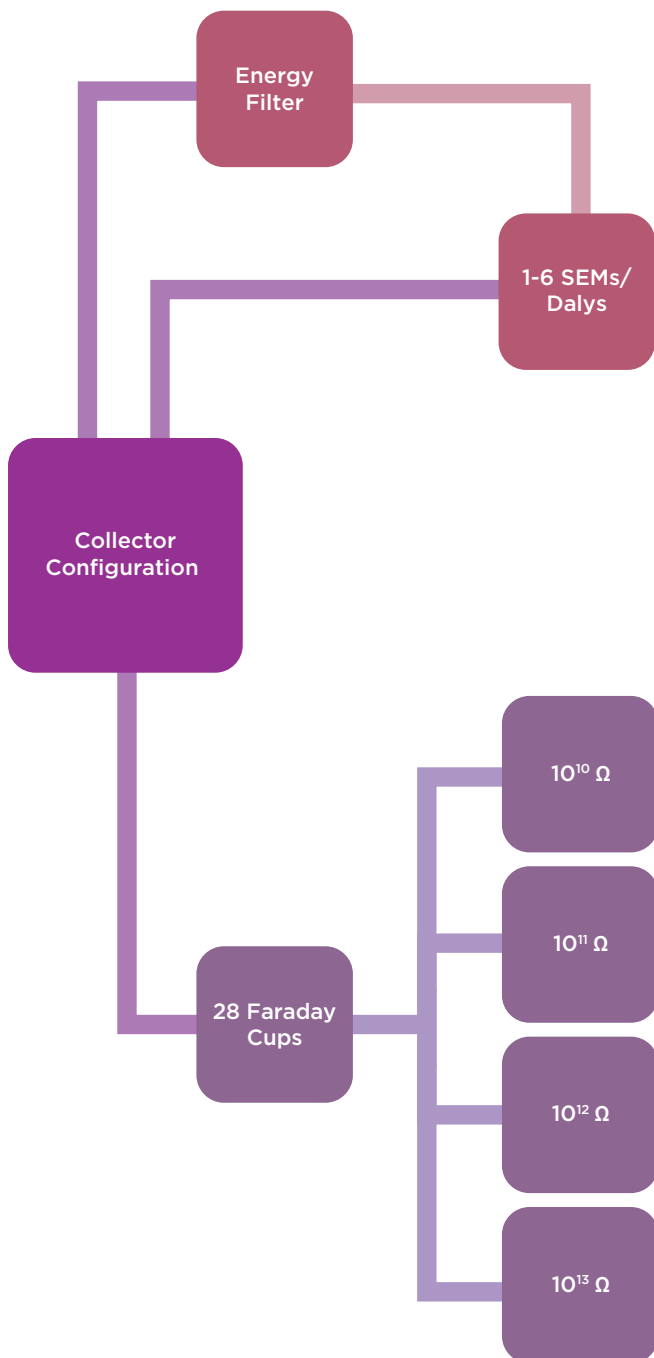


XD Collector

Static multi-collection for the highest dispersion systems

- Low maintenance fixed collector array with 25 % natural dispersion for simultaneous measurement of e.g. Si-Mg, Ca, Fe-Ni or Sm-Nd + Lu-Hf
- Variable Dispersion Zoom Optics for peak alignment and fast switching between isotope systems
- Up to 28 Faraday cups to quantify every isotope of every element including Sn or REEs
- Up to 6 Daly detectors or Secondary Electron Multipliers (SEMs) for detection of the smallest ion beams such as for U-Th series analysis and in situ Re-Os or U-Th-Pb dating
- Increased dynamic range of Faraday pre-amplifiers (110 V for $10^{11} \Omega$)
- Switchable dual-resistor pre-amplifiers for each Faraday cup ($10^{10} \Omega$, $10^{11} \Omega$, $10^{12} \Omega$, $10^{13} \Omega$)
- 0-70 Gcps (0-1100 V) dynamic range from SEM to $10^{10} \Omega$ resistor pre-amplifier
- Excellent abundance sensitivity through dedicated high-vacuum system, mass filter and optional energy filters





Applications

More capabilities, more isotope systems

The advance of isotope research has largely been driven by the geo- and cosmochemical community to unravel the history of the Earth and our Solar System. More recently, isotope ratio analysis are increasingly being utilized in other fields such as environmental monitoring, forensics, or metallomics.

Sapphire XD aims to provide solutions for all applications and topics by combining the high sensitivity of an MC-ICP-MS with the improved precision from multi-collection and interference removal techniques – From Li to U and beyond.



Geo- and Cosmochemistry

Conventional isotope ratio analysis in various resolution modes for, e.g. Mg-Si, Fe, Sr, Nd, Hf, or Pb.

Low-resolution analysis of, e.g. K, Ca, Cr, V, or Fe isotopes, allowing for smaller sample sizes or accessing low-level samples such as mantle rocks or meteorites.

In situ laser ablation dating with, e.g. Rb-Sr, Sm-Nd, Lu-Hf, Re-Os, or U-Th-Pb at higher spatial resolution and precision for (petro)chronological applications.

In situ stable isotopes and trace element patterns, e.g. for Li, B, Si, Ca, REEs, or PGEs at higher spatial resolution and precision in (bio)minerals or paleo-archives.



Life Sciences

Simplified sample preparation and higher sample throughput, e.g. for Cu isotope analysis of high-Na samples.

Less-invasive isotope analysis of biomaterials due to smaller sample size requirement in low-resolution CRC analysis (e.g. K, Fe, or Cu).

Environmental and Forensic Sciences

High-resolution in situ isotope analysis of environmental archives such corals, sediments, or ice cores, e.g. for B, S, Ca, Zn.

Higher sample throughput for routine analysis through reduced chemical preparation and smaller sample amounts, e.g. for food safety or contamination assessment.



Nuclear Safeguarding

Monitoring and fingerprinting of radioactive materials through routine high-precision ion counting.

Ultralow abundance sensitivity through combination of mass and energy filters to accurately quantify over even the largest dynamic ranges for, e.g. U or Pu.

Reduced chemical processing and radioactive waste by mass shifting for, e.g. Sr-Zr(O) or $\text{U}(\text{O}_2)$ -Pu.

Service & Support

The Nu benefit

Exceptional customer support. No exceptions

Investing in a Nu instrument means much more than just the instrument. Nu's commitment to exceptional customer experience ensures you receive only the best service.

Technical help is just a call or email away, and Nu endeavours to respond to all service requests within 24 hours. All enquiries are handled by experienced engineers, who work closely with our R&D and application specialists to provide a tailored solution.

Nu offers a range of service options, from technical support to comprehensive maintenance packages.

- [Direct contact to service and installation engineers](#)
- [Remote support via email, video and phone](#)
- [Range of service contracts available](#)
- [Local service teams](#)

CoDaq Software

Applications

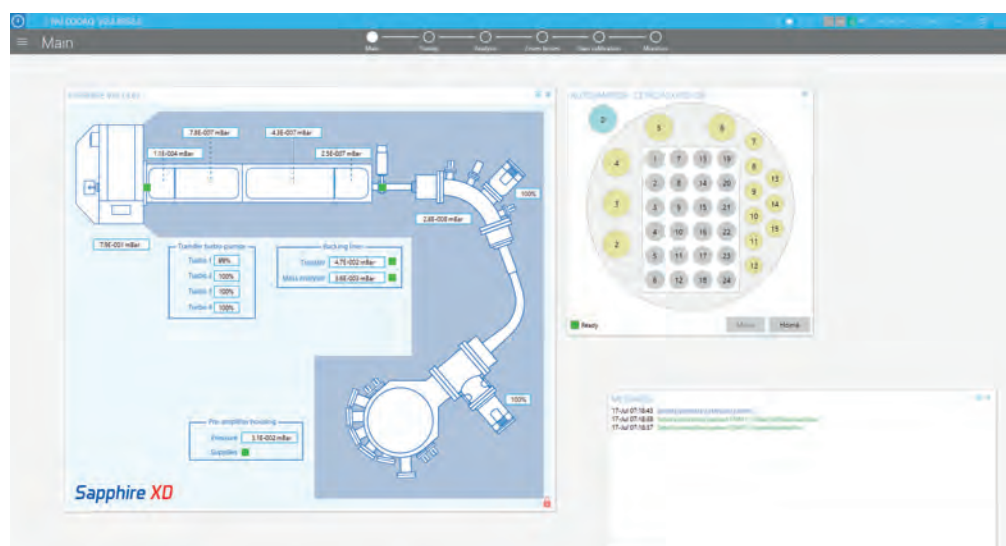
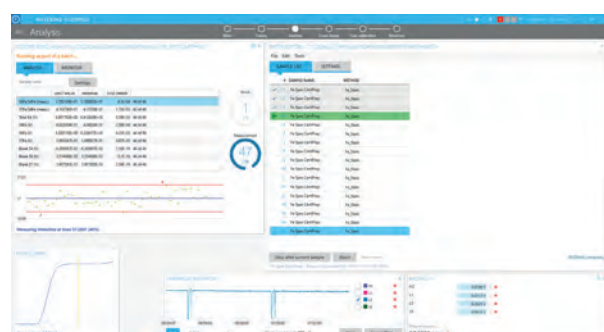
Data Acquisition

First introduced on our Vitesse and Astrum instruments, the user-friendly CoDaq software platform was developed in conjunction with our customers. Prioritizing user experience, CoDaq software allows for multiple access levels, automated workflows and customisable dashboards.

CoDaq is designed to appeal to new and experienced users alike.

- Create workflows for routine analysis, minimising repetition
- Define your method step by step - drop selection workflow creation
- Ability to utilize Python-based scripts for data acquisition and reduction
- Easy and improved integration of third-party accessories
- Highly upgradeable software architecture

Fully customisable user dashboards, with workflow arrangement providing the choice to display essential data only or fully explore every setting. Visual display of key information gives insight at a glance.



Sapphire XD Features

For full specifications contact nu.info@ametek.com

Standard Features

Third Generation ICP Source

- Enhanced sensitivity interface
- Plasma shield
- Robust frequency tuning RF generator
- Compact, high performance multistage dry interface pump

Sample Introduction

- Peltier cooled spray chamber (wet plasma)
- Easy coupling with desolvating nebulisers (dry plasma), hydride generators, laser ablation, gas chromatography

Dual Path Transfer Optics

- Collision/Reaction Cell-ready enhanced transfer optics fitted as standard

Variable Dispersion and Fixed XD Collector Array

- Instantaneous switching between dynamic cup configurations or isotopic systems during analysis with unique zoom optics
- Collectors in fixed positions
- 28 Faraday cups

Ultra-High Vacuum system

- Oil free backing pumps
- High performance turbo-molecular pumps
- Vacuum protection features to preserve vacuum integrity
- Excellent abundance sensitivity further enhanced with optional deceleration filters

High-Resolution

- High resolution capabilities independent of path selected
- Software selectable Standard, Medium, and High-Resolution modes

Optional Features

Collision/Reaction Cell

- Hexapole Collision/Reaction Cell
- Up to 4 mass flow-controlled collision/reaction gas inlets
- Fully by-passable

Multi-Ion Counting Capabilities

- Up to six ion counting channels
- Choice of full-sized Discrete Dynode Secondary Electron Multipliers or Daly detectors for each channel
- Up to 6 deceleration filters

Dual-Resistor Faraday Pre-Amplifiers

- Any combination of $10^{10} \Omega$, $10^{11} \Omega$, $10^{12} \Omega$, $10^{13} \Omega$ per Faraday cup with optional Dual-Resistor Pre-amplifiers
- Up to 28 Dual-Resistor Pre-Amplifiers can be accommodated

Borosilicate-free introduction system kits for wet and dry plasma

ICP-MS RANGE

For full specifications contact nu.info@ametek.com



Plasma 3

The Plasma 3 is a third generation Multi Collector ICP Mass Spectrometer (MC-ICP-MS), designed to provide the best possible precision and accuracy for simultaneous isotopic ion detection.

- Variable zoom optics
- Multiple Daly detectors
- Sixteen Faraday cups



Sapphire 1700

The Sapphire 1700 is a unique High Resolution Multi Collector ICP-MS from Nu Instruments providing the ultimate in high resolution isotope ratio measurements.

- Large geometry MC-ICP-MS with the highest resolution
- Independently-adjustable collector slits for true high resolution
- Superior abundance sensitivity



Attom

The Attom ES is a double focussing inductively coupled plasma mass spectrometer that has been purpose designed to be the ultimate tool for rapid and precise isotope ratio and quantitative analysis of trace elements in solid and liquid matrices.

- Fast, high sensitivity imaging with 73 elements measured in <150 ms
- Fastest data acquisition for nanoparticles at 10-70 μ s dwell times
- Most flexible yet easy to use data processing with Nu Quant



Vitesse

The Vitesse is a time-of-flight inductively coupled plasma mass spectrometer that has been purpose designed to be the ultimate tool for high speed multi-element applications such as laser ablation imaging and nanoparticle analysis.

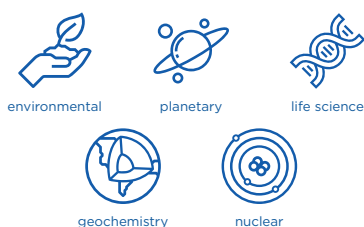
- Fastest wide mass range data acquisition for applications such as laser ablation imaging and nanoparticle analysis
- Determination of elemental composition of individual nanoparticles
- Segmented reaction cell optimised for multi-element analysis

Sapphire XD

Innovators in
Mass Spectrometry



Dual Path Multi-Collector ICP-MS with Collision/Reaction Cell



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质谱领域的创新者。我们提供尖端的科学和技术解决方案，并为客户提供无以伦比的支持和维保服务。

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