

Welcome !

Denver, CO
Houston, TX
February 2009

U.S. LC/MS Innovations Seminar Tour

Mass Spec/tacular
performance, productivity and reliability.



Agilent Technologies

• Schedule & Introductions

• Announcements

- Safety

- Evaluation forms

- Upcoming events

> CBMSS, Feb 10th, Nat'l Jewish Center, www.cbmss.org
(also Apr 22nd)

> AAFS, Feb 16th – 21st, Denver Conv. Ctr., www.aafs.org

> Pittcon 2009, Mar 8th – 13th, Chicago (McCormick Place)

www.pittcon.org; <http://www.chem.agilent.com/en-US/Events/en-US/pittcon/Pages/pittcon2009.aspx>

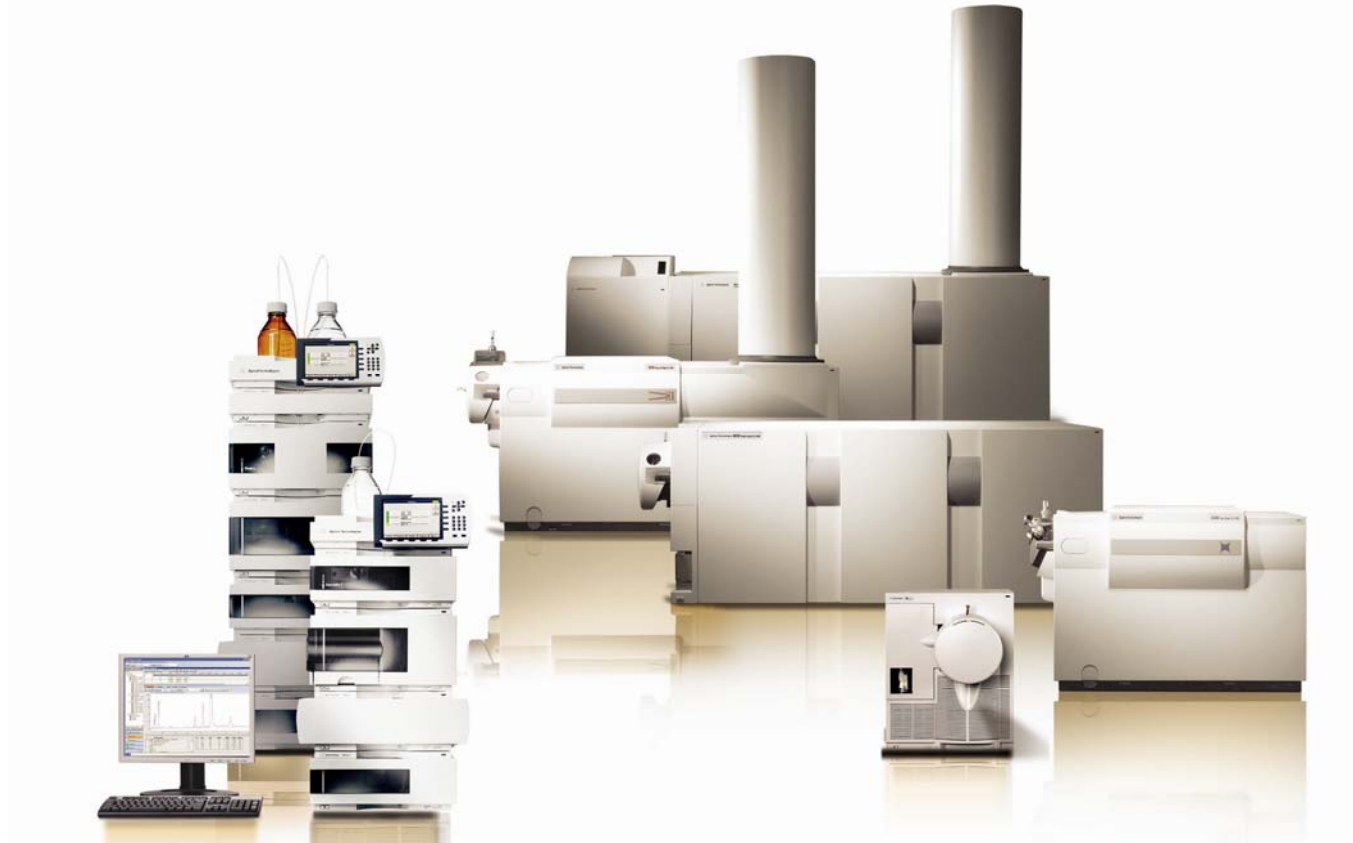
> AACR, Apr 18th – 22nd, Denver Conv. Ctr.

www.aacr.org



Agilent LC/MS Overview

Leading the Industry in Performance and Reliability



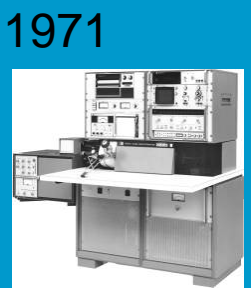
LC/MS Innovations Tour: Denver 2009



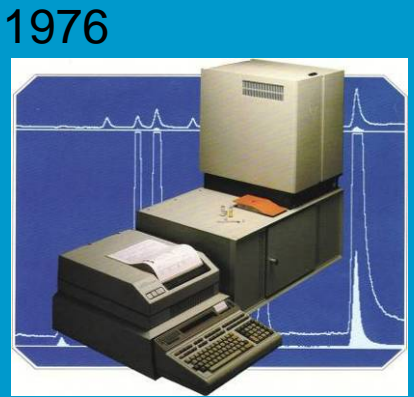
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Agilent's 37 Year Heritage in Mass Spectrometry

GC/MS 1971 - 2007



5930A



5992A



5970B MSD



5975C

ICP-MS 1994 - 2006



4500



7500cx

LC/MS 1994 - 2004



LC/MSD, LC/MSD Ion Trap



LC/MSD TOF

- Over 27,000 GC/MS, 2,500 ICP-MS and 4,500 LC/MS systems
- Agilent (and previously, as HP) has sold more quadrupole MS systems than any other mfr.

Agilent's newer LC/MS systems – A look inside



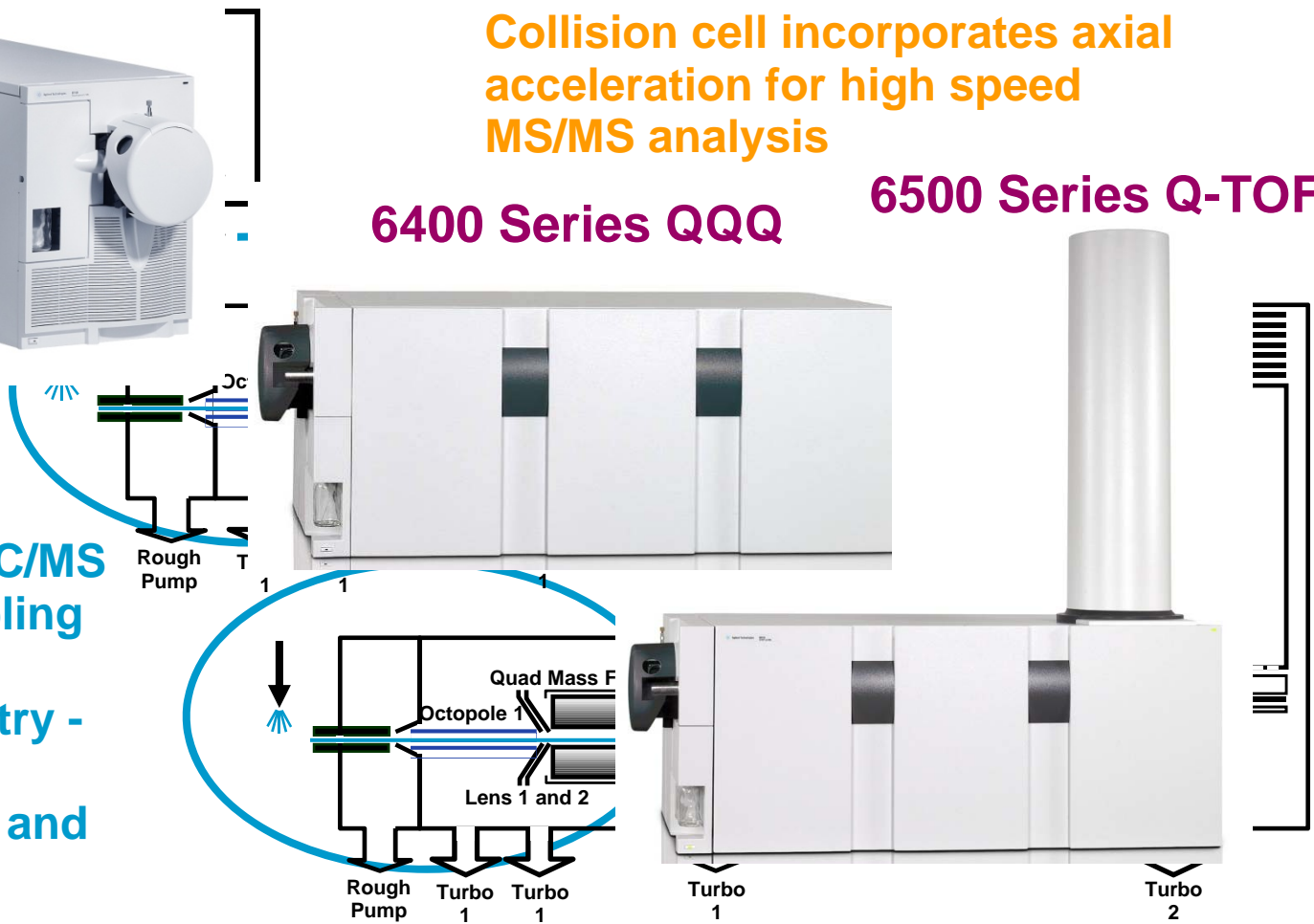
6100 Series SQ

Collision cell incorporates axial acceleration for high speed MS/MS analysis

6400 Series QQQ

6500 Series Q-TOF

Over 10 years in LC/MS atmospheric sampling and patented orthogonal geometry - result in industry leading sensitivity and robustness



Major milestone !!

> 900 Agilent Triple Quads Sold!

408 in FY08!



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Agilent LCMS at Beijing 2008 Olympics



- CADA Lab (China Anti-Doping Lab)
- 18 Agilent LCMS Systems
- 19 Agilent GC/MS Systems
- 10 Agilent Application Engineers

- >4,500 samples
- 24 hr turnaround time
- 100 CADA scientists



"Agilent's liquid chromatography and mass spectrometry instrumentation will help make China's Anti-Doping Agency testing in the 2008 Olympic Games the most technologically advanced yet."

Dr. Du Lijun, Director of China's Anti-Doping Agency



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The 6000 Series LC/MS portfolio



6500 Series QTOFs

Ultimate MS/MS system value with high analytical performance for accurate mass based structural studies and identification of proteins and small molecules



6400 Series Triple Quadrupoles

High sensitivity MS/MS system for targeted quantitative, confirmatory analysis

6300 Series Ion Traps

sensitivity MSⁿ system for the screening and identification of unknowns



6100 Series Single Quads

Easy to use, inexpensive, high selectivity MS system for screening and routine quantitation



6200 Series TOFs

High throughput walk-up accurate mass system for screening and compound confirmation



Powered by: 1200 Series LC and Rapid Resolution System

Qualitative

Quantitative



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LC/MS – Ion sources

Wide range of sampling conditions

Sources are interchangeable between mass spectrometer platforms

Multimode source

- Flow rates up to 2 mL/min
- Simultaneous operation

HPLC-Chip/MS

- Nanoelectrospray without the fuss
- Reproducible response and retention times
- On-chip enrichment for speed and sensitivity

Multimode



HPLC-Chip



APCI



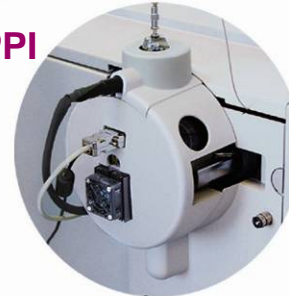
ESI



NanoESI



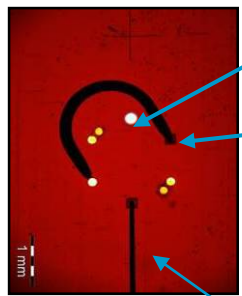
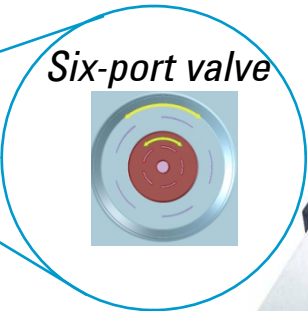
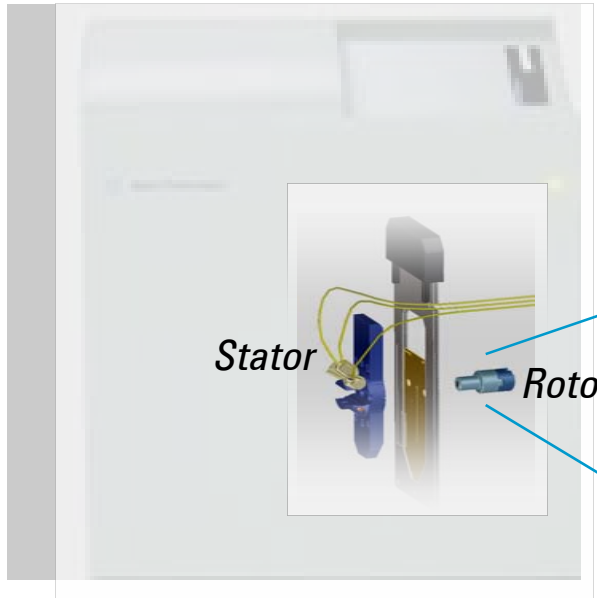
APPI



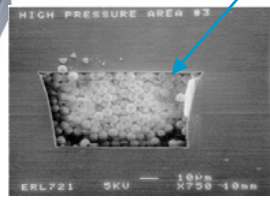
AP-MALDI



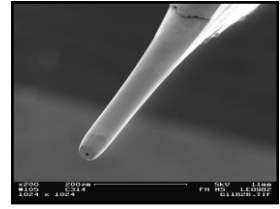
HPLC-Chip technology



- Sample Ports
- Enrichment Column
40 nL, 160 nL
500 nL - NEW

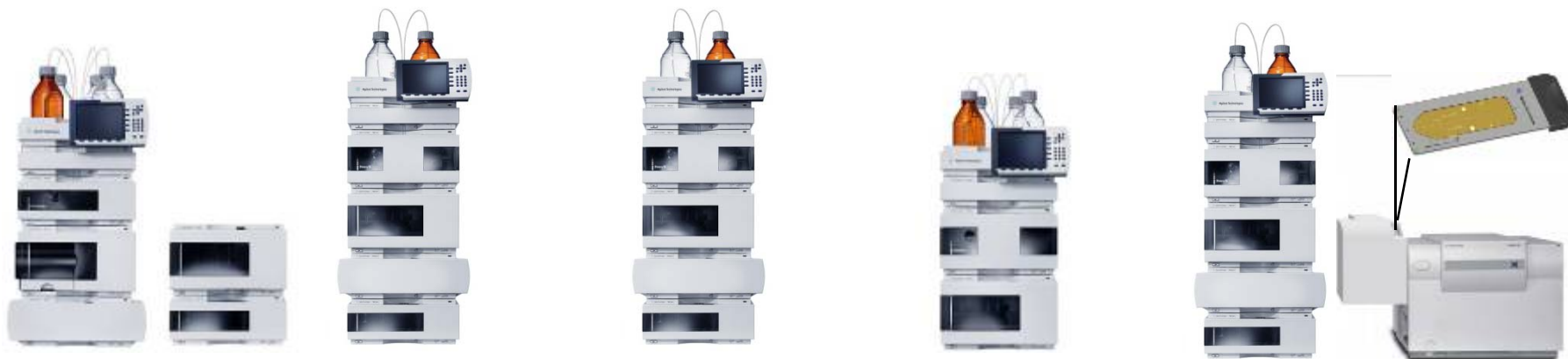


- Analytical Column
75 x 50 μm
cross section
43 mm, 150 mm



- Laser Ablated ESI Tip

Agilent High Performance 1200 Series LC: Best in Class “Front End” Systems for MS



Preparative LC

Standard LC

Rapid Resolution
LC

Capillary &
Nano LC

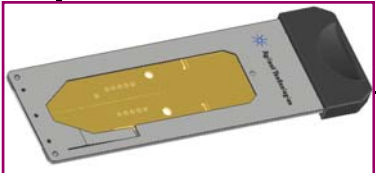
High Sensitivity
HPLC-Chip/MS

*Chose from the industry's most comprehensive LC portfolio to
configure an integrated LC/MS system*

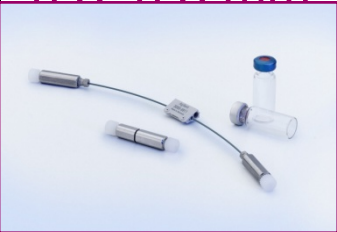


Agilent LC-MS column configurations:

Column Type	Column I.D.	Column Lengths	Particle Sizes	Flow Rate Range
Nano	0.075, 0.10 mm	50, 150 mm	3.5 um	100 – 600 nL/min
Capillary	0.3 – 0.5 mm	35, 150, 250 mm	3.5, 5 um	– 1000 nL/min
Chip LC	2.1 mm	15 – 250 mm	1.8, 3.5, 5 um	10 – 60 ul/min
Solvent Saver	3.0 mm	50 – 250 mm	3.5, 5 um	0.3 – 1 mL/min
Analytical	4.6 mm	15 – 250 mm	1.8, 3.5, 5um	1 – 1.5 mL/min



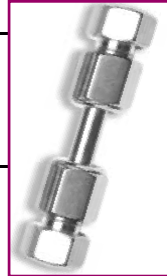
Chip LC



Nano LC



Capillary LC



Analytical LC

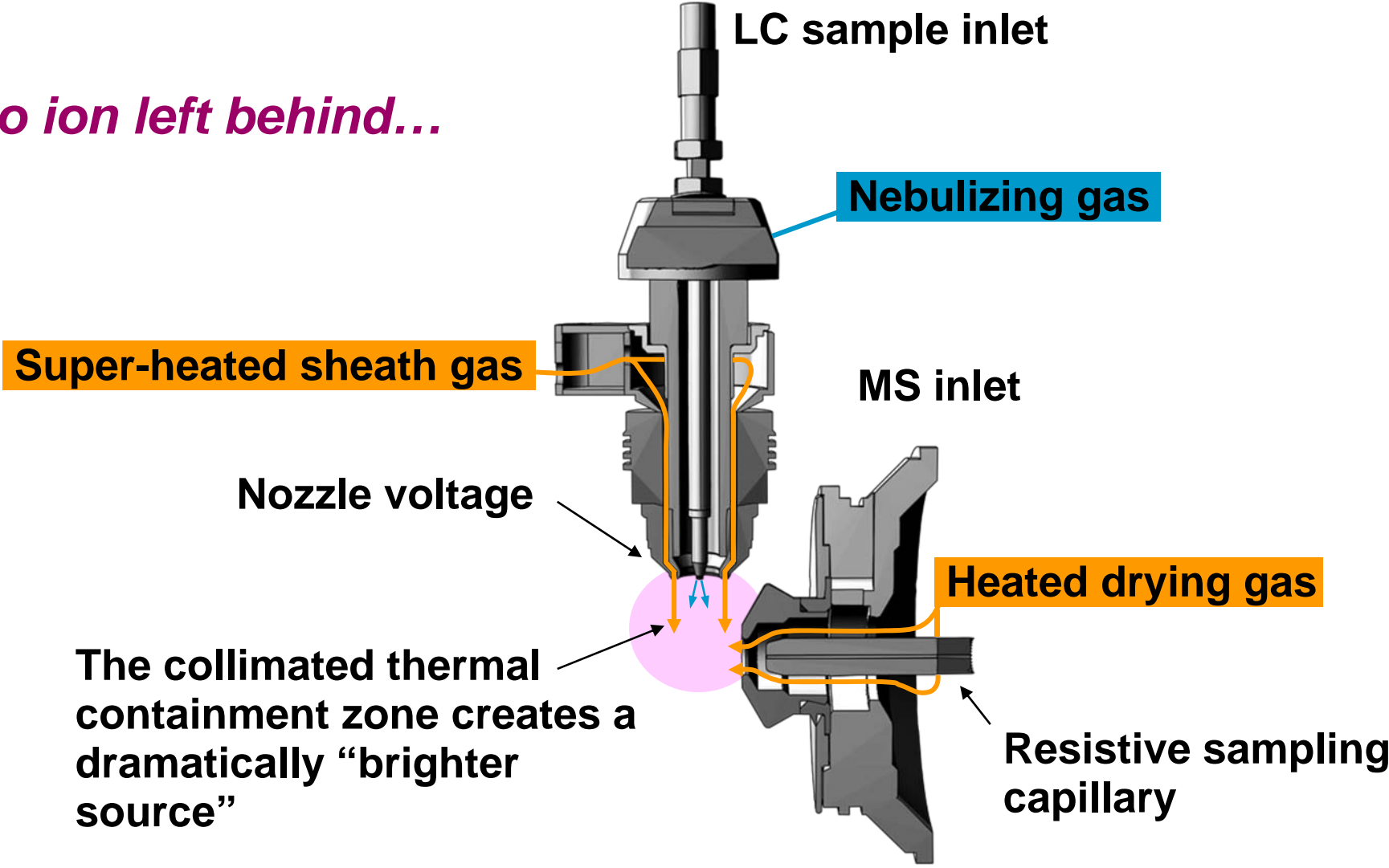


Prep LC

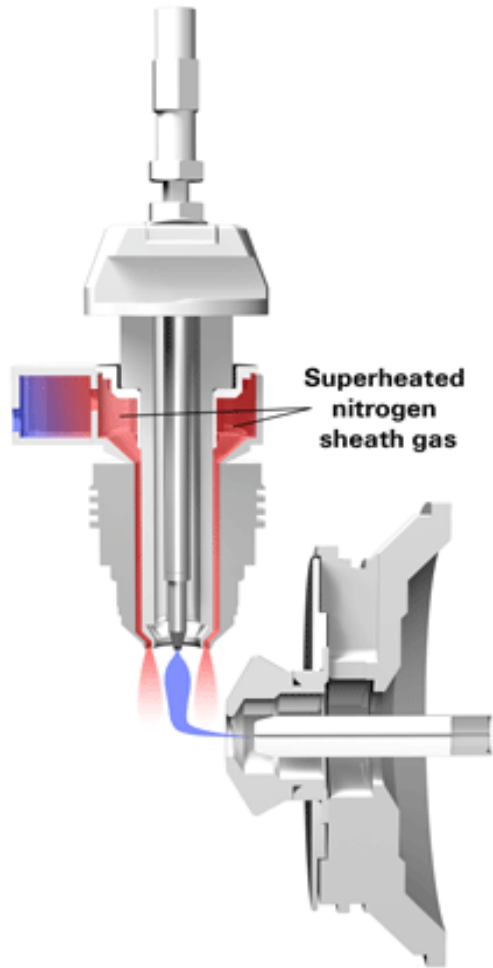
... plus Prep columns – 9.4, 21.2, 30, and 50 mm id

Agilent Jet Stream ion generation

No ion left behind...



Agilent Jet Stream: Thermal Gradient Focusing technology



Innovations with new “Agilent Jet Stream” Technology: *5-10x increase in sensitivity*

6460 LC/QQQ



6530 LC/Q-TOF



New 6460 Triple Quad: World's Most Sensitive QQQ with Agilent Jet Stream Technology

Triple Quad LC/MS

NEW Agilent 6460 Triple Quad LC/MS The World's Most Sensitive Triple Quad!

- Breaking Sensitivity Barriers with Agilent Jet Stream Technology
- Ultra-sensitive food safety and water analysis
- New MassHunter MS Optimizer Software for automated method development



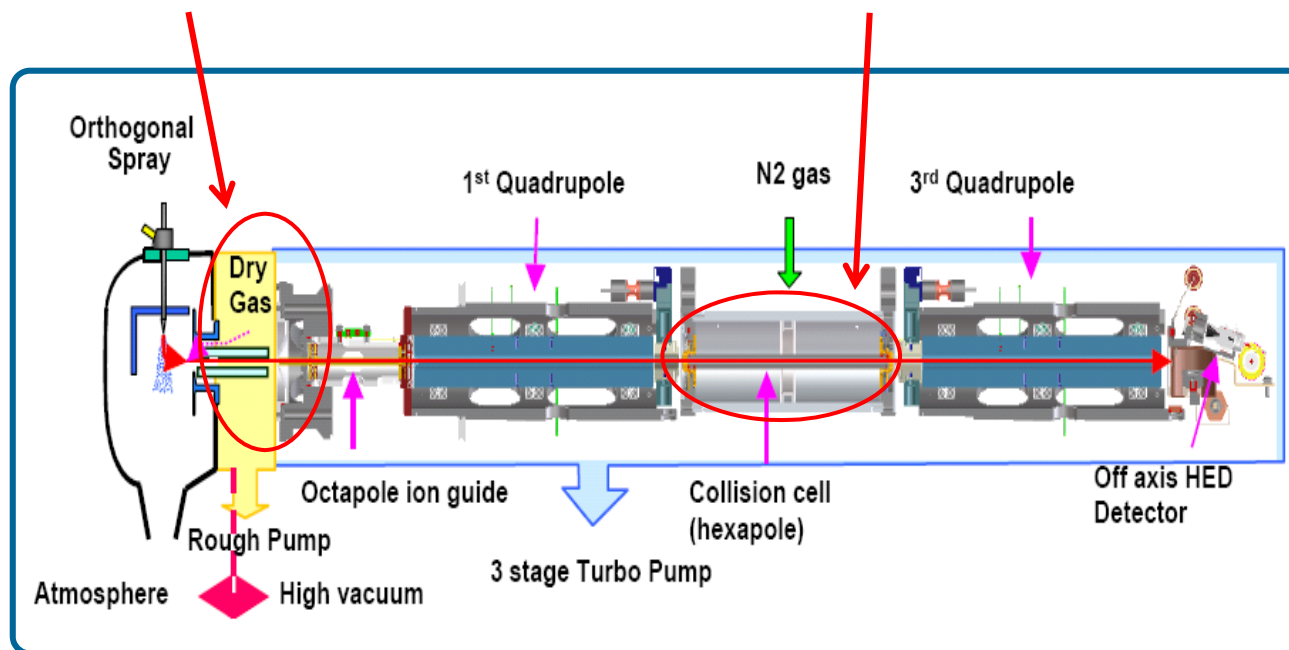
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QQQ MRM optimization:

2 key parameters:

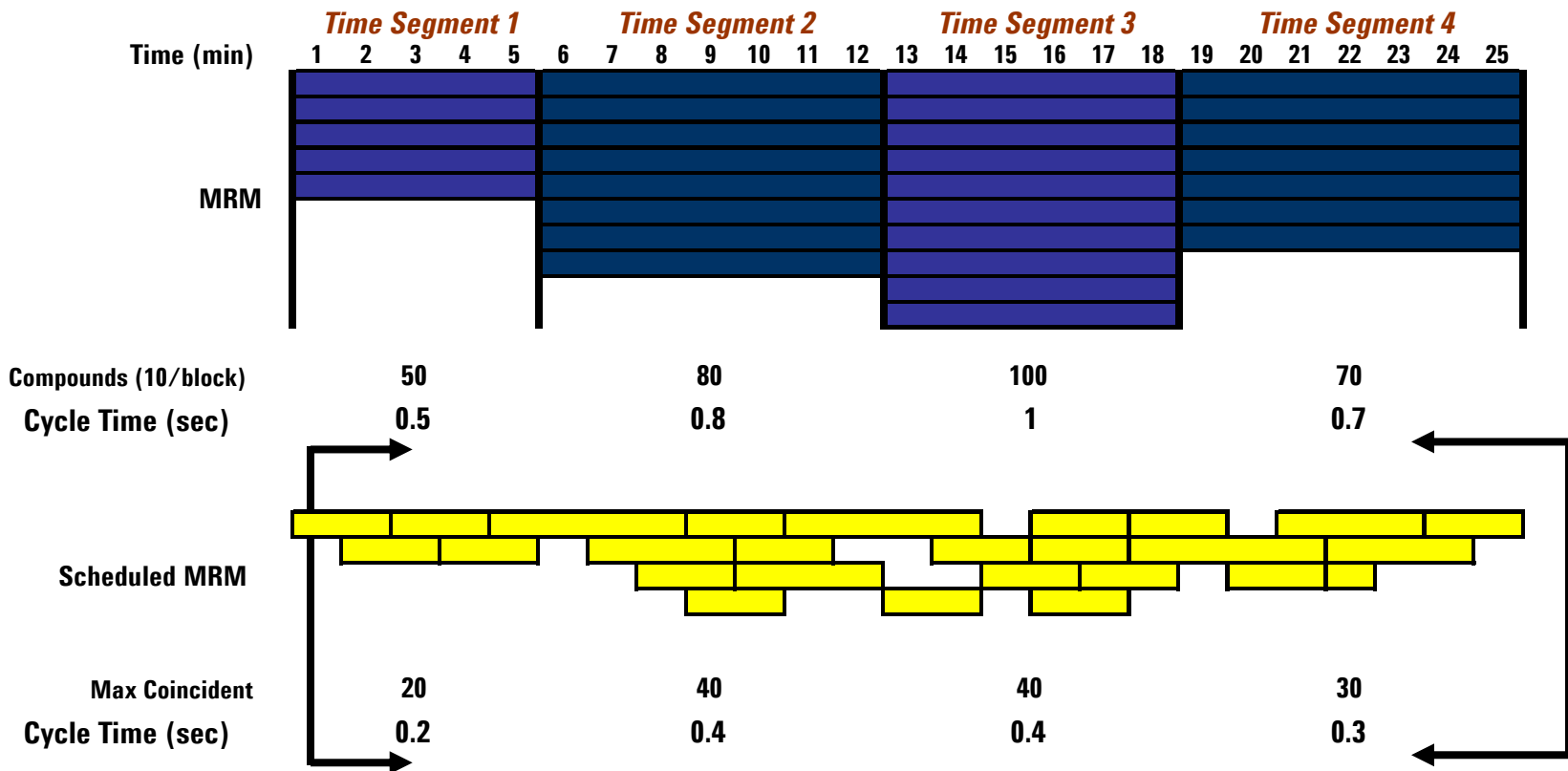
Fragmentor Voltage

Collision Energy



MassHunter “Dynamic MRM”

A simple comparison of MRM and “Dynamic MRM”



=> 2 x shorter cycle times supports narrow chromatographic peaks, more analytes or longer dwell per analyte.

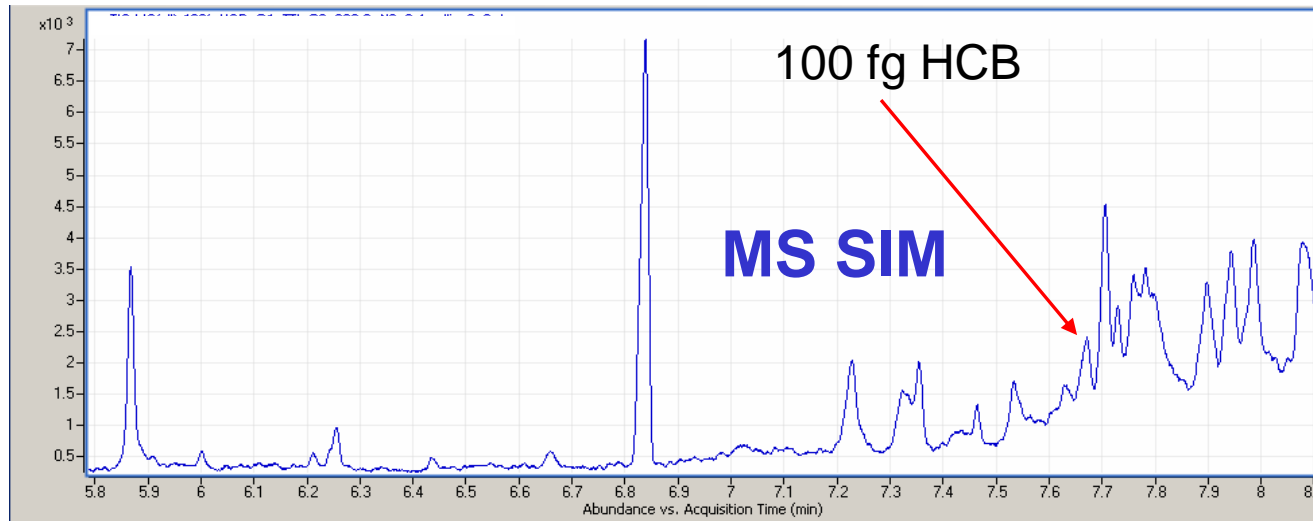
Introducing the Agilent 7000 Series GC Triple QQQ: Shipping Feb'09



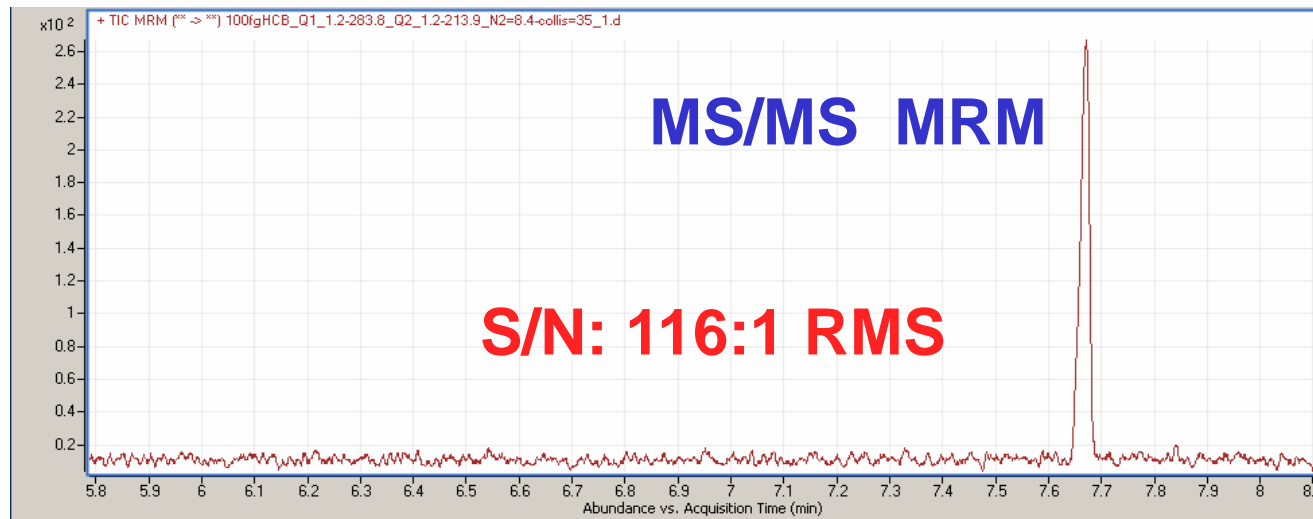
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Why a Triple Quadrupole?

A picture is worth a thousand words.



GC/MS Single Quad
SIM



GC/MS/MS QQQ MRM
EI 100 fg HCB in
"DIRTY" Matrix



Cutting Edge 6530 Q-TOF Performance

With...

Agilent Jet Stream Technology

True Hi-Def TOF Technology

**Unmatched sensitivity, speed
and mass accuracy**

**Unique data mining tools for
faster compound ID**



- ✓ Mass accuracy – approaching FTMS mass accuracy
- ✓ Sensitivity- high femtogram level detection
- ✓ Increased resolving power: >20,000
- ✓ Extended dynamic range: 5 Decades in-Scan
- ✓ Acquisition speed: 10 MS/MS per second

Leads the industry
in all dimensions*

* For systems less than 0.5 Ton and 9 feet in height



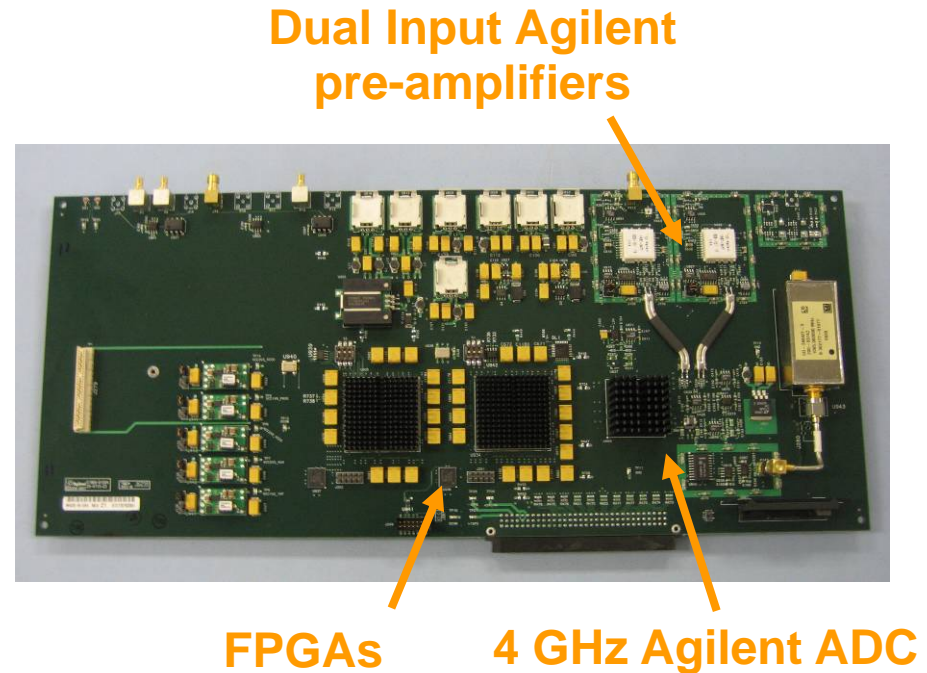
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New Ultra High Speed Acquisition

Matching TOF/QTOF Analyzers and Electronics Performance

**Two New Modes: 4 GHz for Enhanced Resolving Power
2-Channel x 2 GHz Dual Gain for
Extended Dynamic Range**

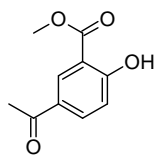
- 4 GHz (8 bit) Analog-Digital-Converter **ADC**
 - Adapted from Agilent's High Speed Oscilloscope Systems
- Ultra High Speed **FPGA** process and store transients in real time
 - Up to 20,000 m/z depth





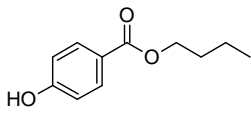
4 GHz ADC resolution example: two compounds

- nominally 195 m/z separated by 0.036 Da



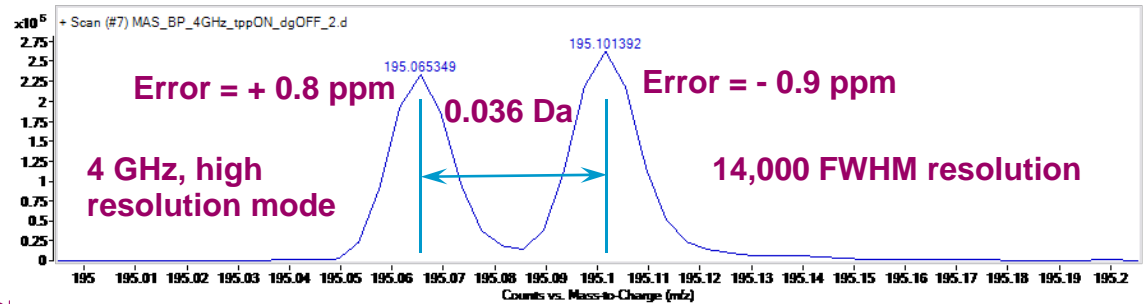
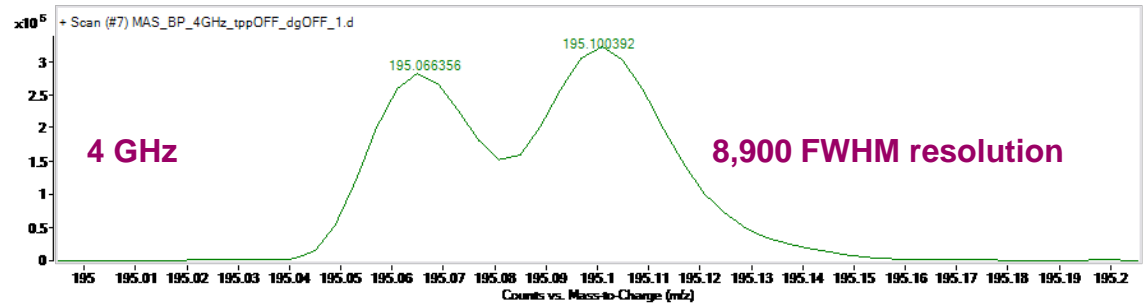
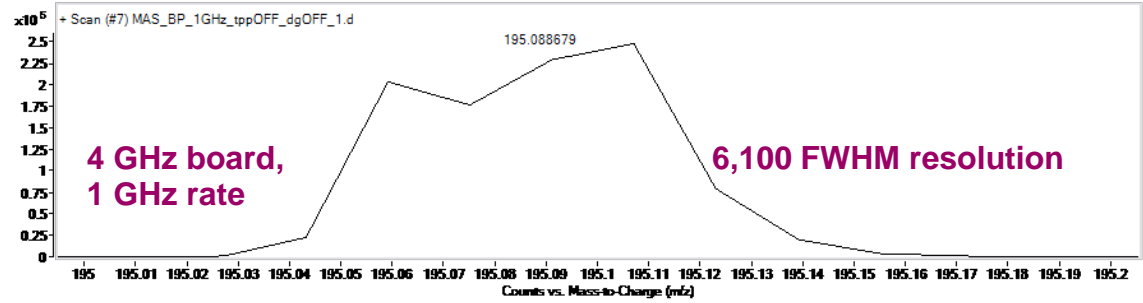
Methyl 5-acetylsalicylate

[M+H]⁺ 195.065185 m/z



Butyl paraben

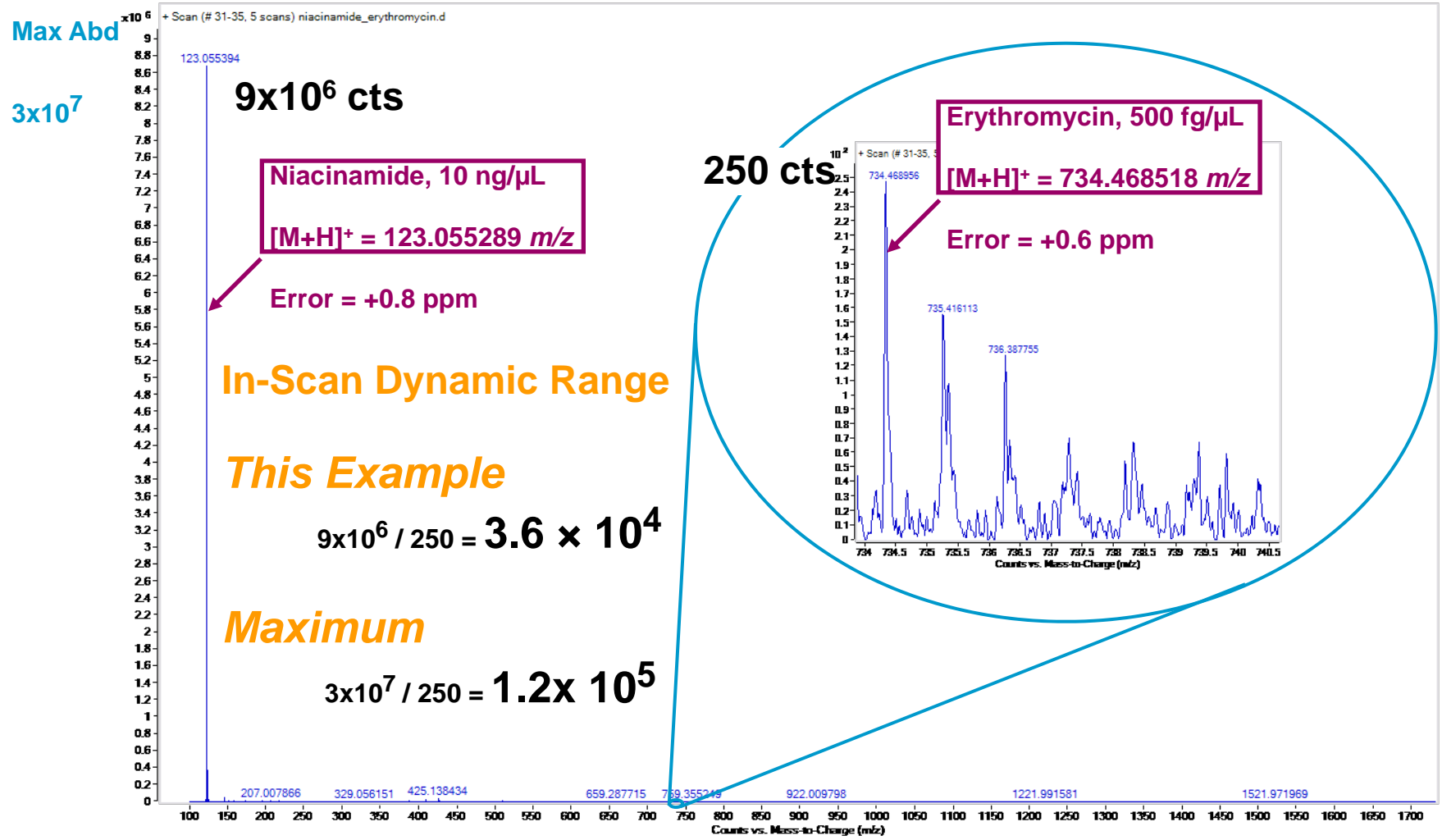
[M+H]⁺ 195.101571 m/z



FIA, 2 scans/sec (6713 transients/scan)

2 IRM averaged over five scans

New 4 GHz acquisition system – up to 5 decades of in-spectrum dynamic range



New Agilent MassHunter Workstation Software

Instrument Control

- Real-time monitoring
- Method set-up
- Autotune

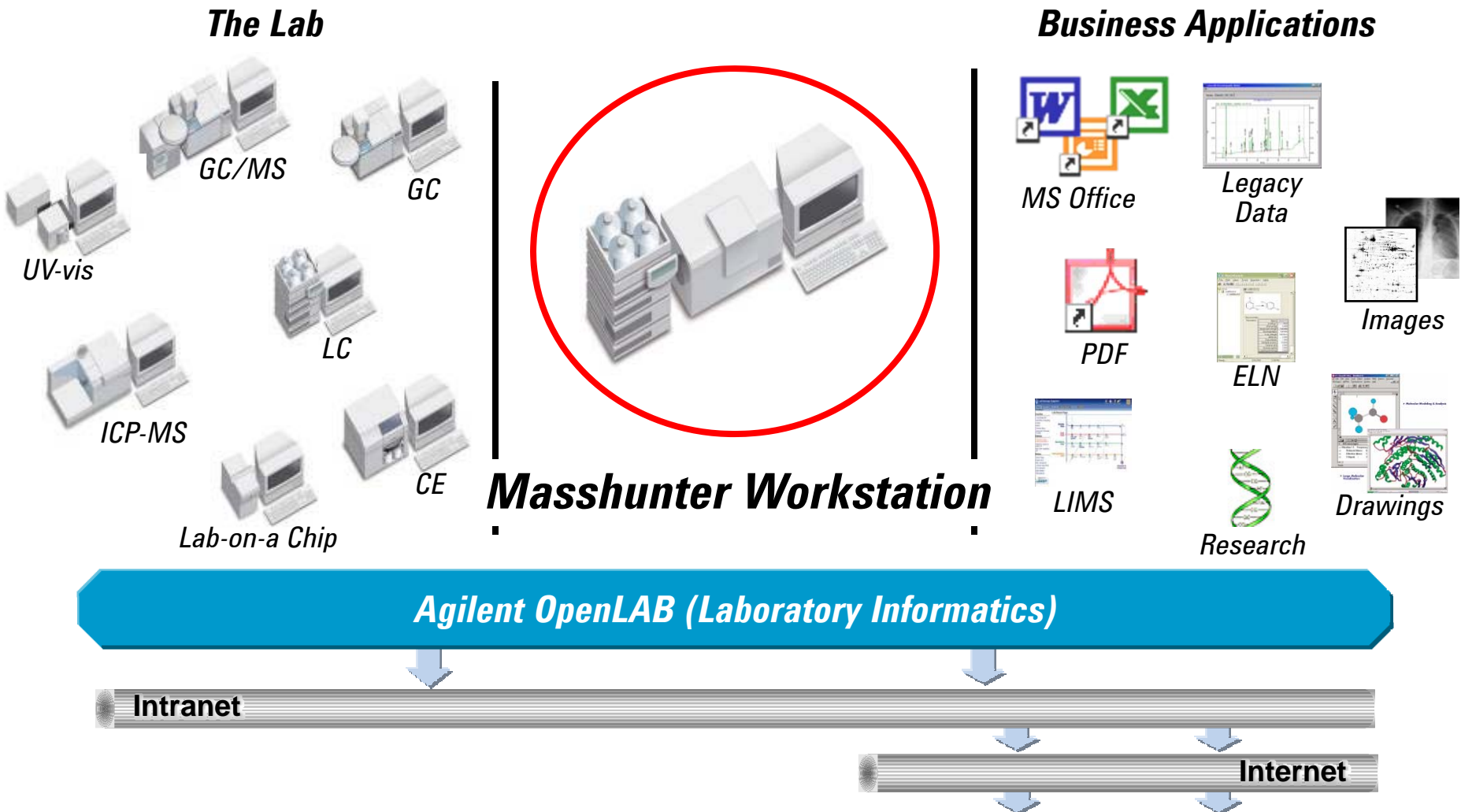
Qualitative Analysis

- Chromatographic results
- Spectral results
- Find compounds

Quantitative Analysis

- User filters
- Compound results
- Calibration curve

Full integration: the lab, business applications, OpenLAB, the company network





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