

The 33rd International Conference on Ion Mobility Spectrometry

ISIMS 2024

Miami Beach

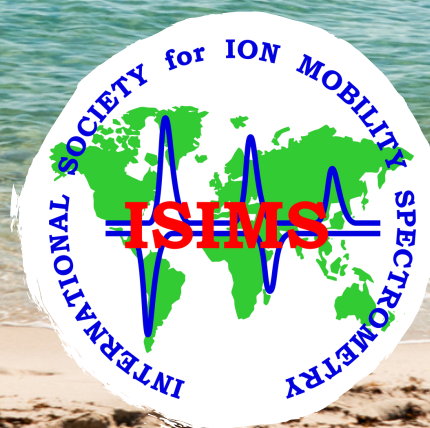
JULY 20-26



SHORT COURSE OPERATING PRINCIPLES, APPLICATIONS,
SAT & SUN JULY 20-21 HANDS-ON TRAINING & MORE

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INSTRUCTION TEAM



**PROF. BRIAN H.
CLOWERS**



**DR. MAGGIE
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**PROF. FRANCISCO
FERNANDEZ-LIMA**



**DR.-ING
ANSGAR KIRK**



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HAACK**

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The Short Course on IMS and IMS-MS is one-of-a-kind professional training offered outside of university graduate programs for IMS and IMS-MS.

SHORT COURSE
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Suitable for individuals with varying levels of experience including those who are new to the field!

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**Who Should Take the Short
Course?**

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**Program
Manager**

**Student &
Post-doc**

**Equipment
Manufacturer**

**Researcher
& Scientist**

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Syllabus

- History of IMS
- Operating Principles of IMS
- Ionization Sources
- Ion Chemistry
- Collisional Theory
- Measuring Mobility
- Various types of IMS & IMS-MS
- Applications of IMS

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Lectures covered various forms of IMS (e.g., drift tube IMS, DMS, TWIMS, TIMS, cyclic IMS, AIMS), stand-alone IMS instrument & tandem systems (e.g., coupled to chromatograph & mass spectrometer).

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HISTORY

The history of IMS is explored to provide context for modern mobility measurements and to establish a foundation to push future boundaries of gas-phase measurements.

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From Thomson and Rutherford, Tyndall, Lovelock, McDaniel, Cohen, Karasek and other pioneers in IMS.

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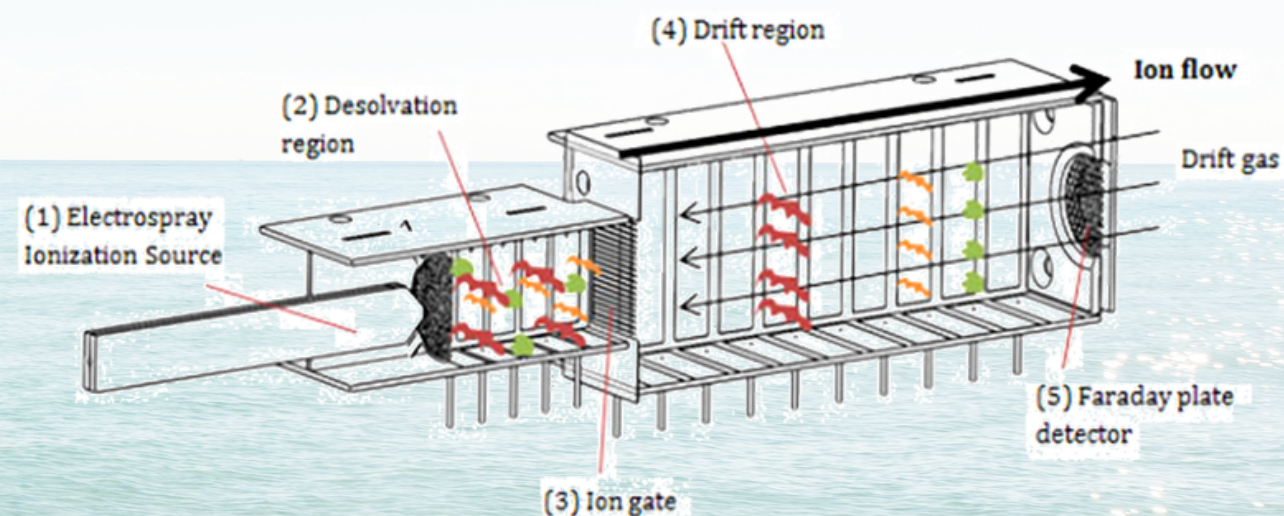
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OPERATING PRINCIPLES

We'll study components of IMS: sample inlet, ionization source, drift tube, gating mechanism, aperture grid, detector and data collection; and different types of IMS: drift tube IMS, DMS, TWIMS, TIMS, cyclic IMS, AIMS.

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IONIZATION SOURCES

The formation of gas phase ions is an important aspect in IMS. Ionization sources frequently used with IMS will be presented, including their advantages and disadvantages.

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"The formation of ions from neutral sample molecules is the first and possibly the most significant event during ion mobility measurement."

H. Borsdorf, R. G. Ewing,
IJIMS, 2015, 18, 31-32

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IONIZATION CHEMISTRY

Why are these ions observed in a spectrum? Why do these ions have a particular drift times? Why other ions are not observed? How can we exploit the ion properties to realize an analytically useful result?

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We will discuss clustering, ionization kinetics, relative ionization efficiency and their implications on IMS.

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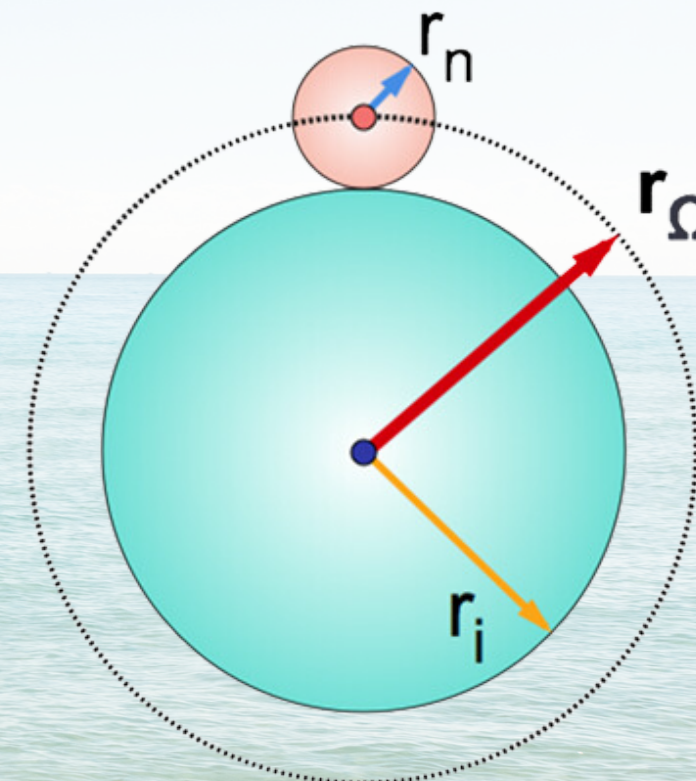
COLLISIONAL THEORY

We will study the core equation for IMS, the five assumptions of ion mobility, collisional cross section, and the mobility dependence on electric field.

$$\Omega_0 = \frac{3}{16} \left(\frac{2\pi}{\mu kT} \right)^{1/2} \frac{eE}{v_d N} = \frac{3}{4} \frac{eE}{\mu v_d v_T N}$$

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$$\Omega = \pi d^2 = \pi(r + R)^2$$

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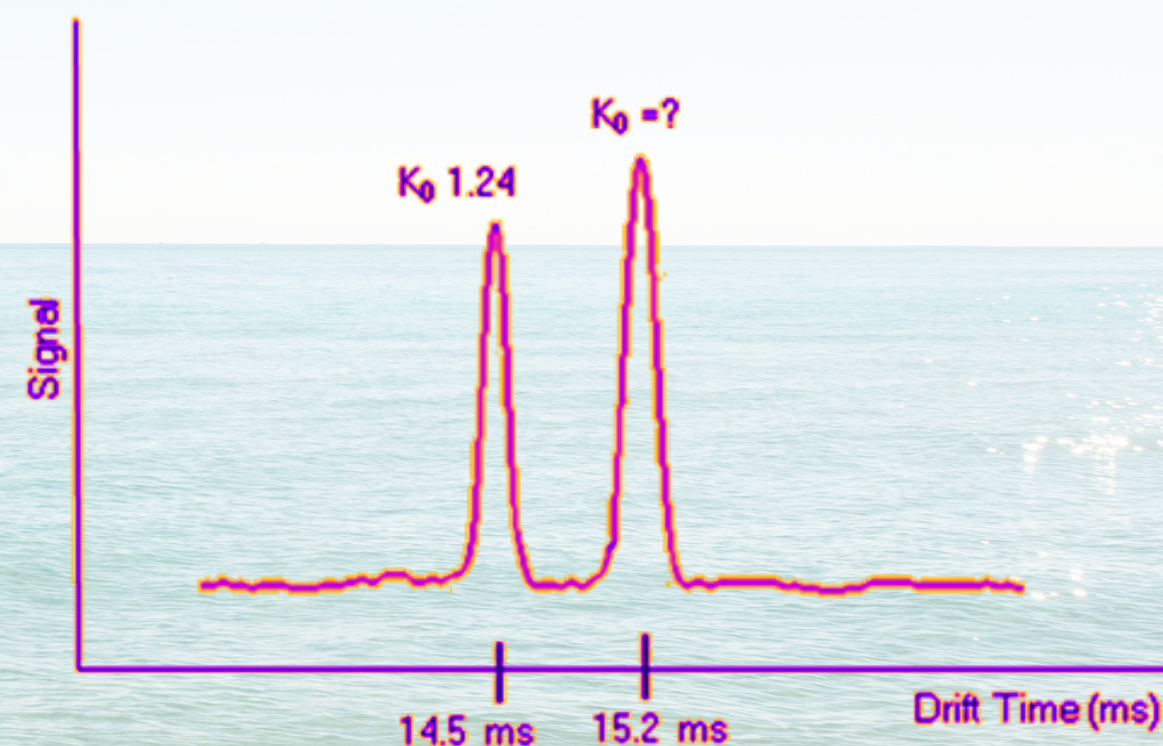
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MEASURING MOBILITY

Learn how to calculate reduced mobility values from experimental parameters and how to estimate the minimum separation capacity (resolving power) required to distinguish two closely drifted analyte ions.

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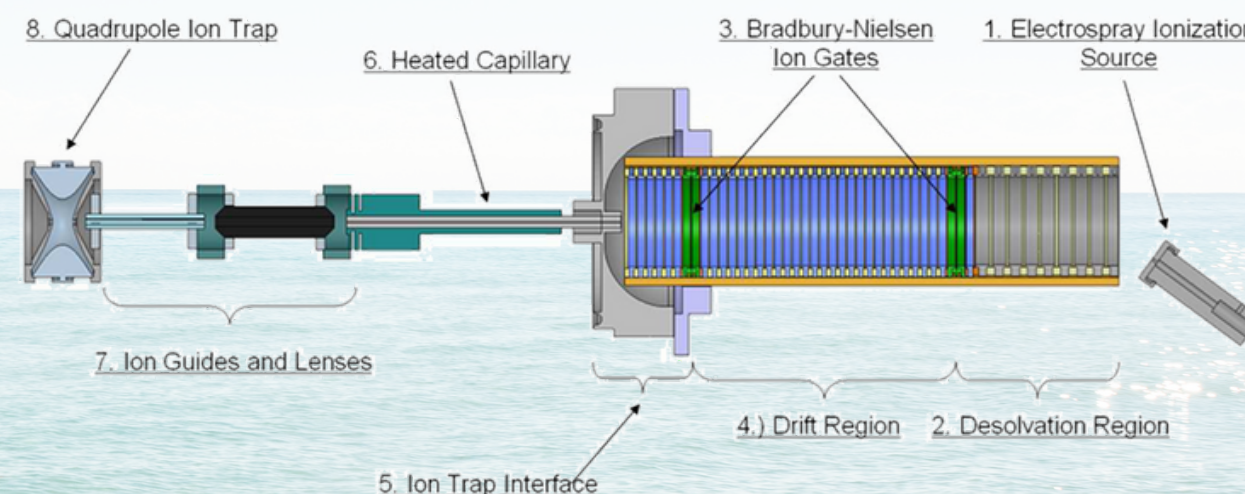
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HYBRID INSTRUMENTS

Hybrid IMS systems are frequently utilized in studying complex matrices to enable multi-dimensional separation. We will discuss chromatographic and mass spectrometric hybrids.

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B. H. CLOWERS, H. H. HILL, JR.,
ANAL. CHEM. 2005, 77, 5877-5885

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Security Application

IMS is suitable when time, resources and sample quantity are limited, which is often the case in security applications. The major IMS security applications are detection of chemical agent, explosives, and drugs.

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We will discuss classic papers, real cases and challenges in security applications.

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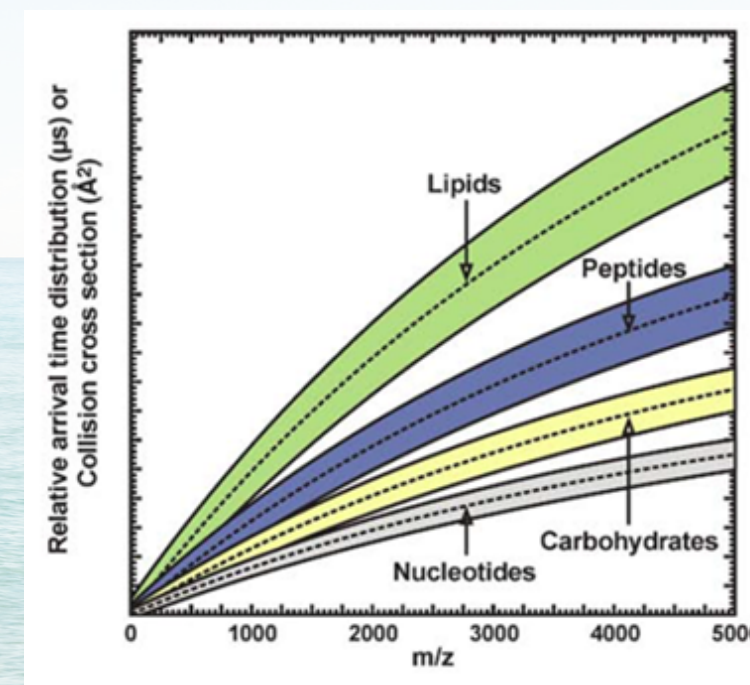
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Biomolecular Application

We will discuss the benefits of mobility drift time separation in hybrid systems, trendlines, gas phase conformations, collisional cross section measurements of biomolecules (peptides, proteins, glycans and lipids).

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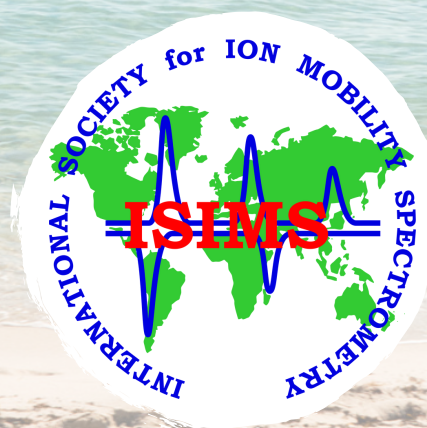
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J AM SOC MASS SPECTROM 2009, 20, 1775-1781

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HANDS-ON TRAINING

Put your newly learned skills to use with hands-on training at the FIU lab: timsTOF, tims FT-ICR MS, and commercial IMS systems!

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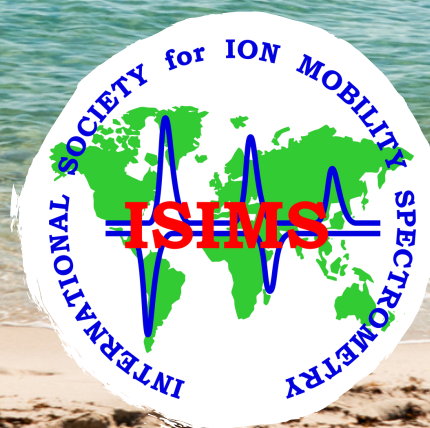
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