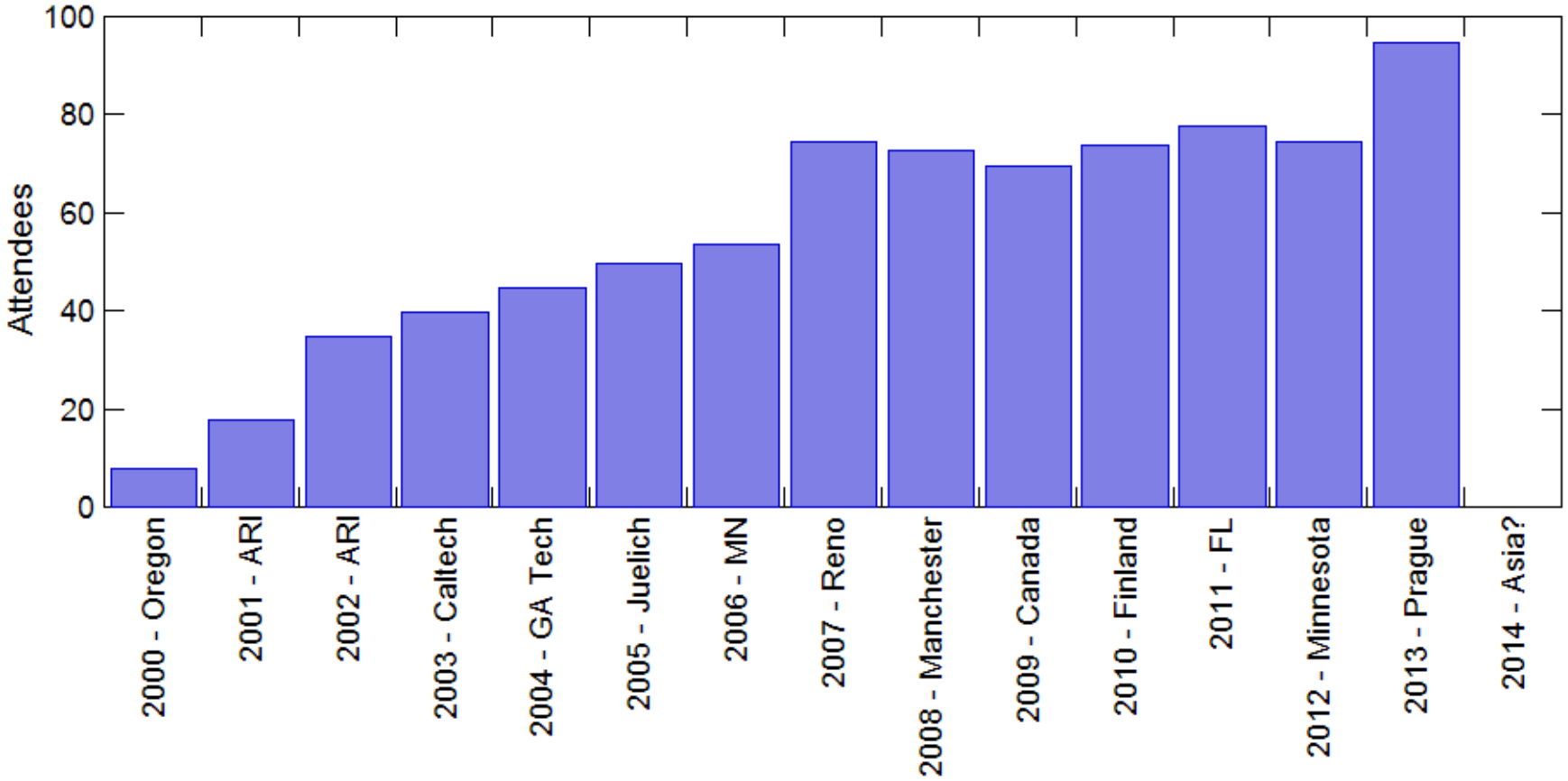
AMS Users Community
Annual Meeting Attendance



680+ Published Articles to date

Overview of Aerosol Instrument Developments

AMS Family and Aerosol Collectors

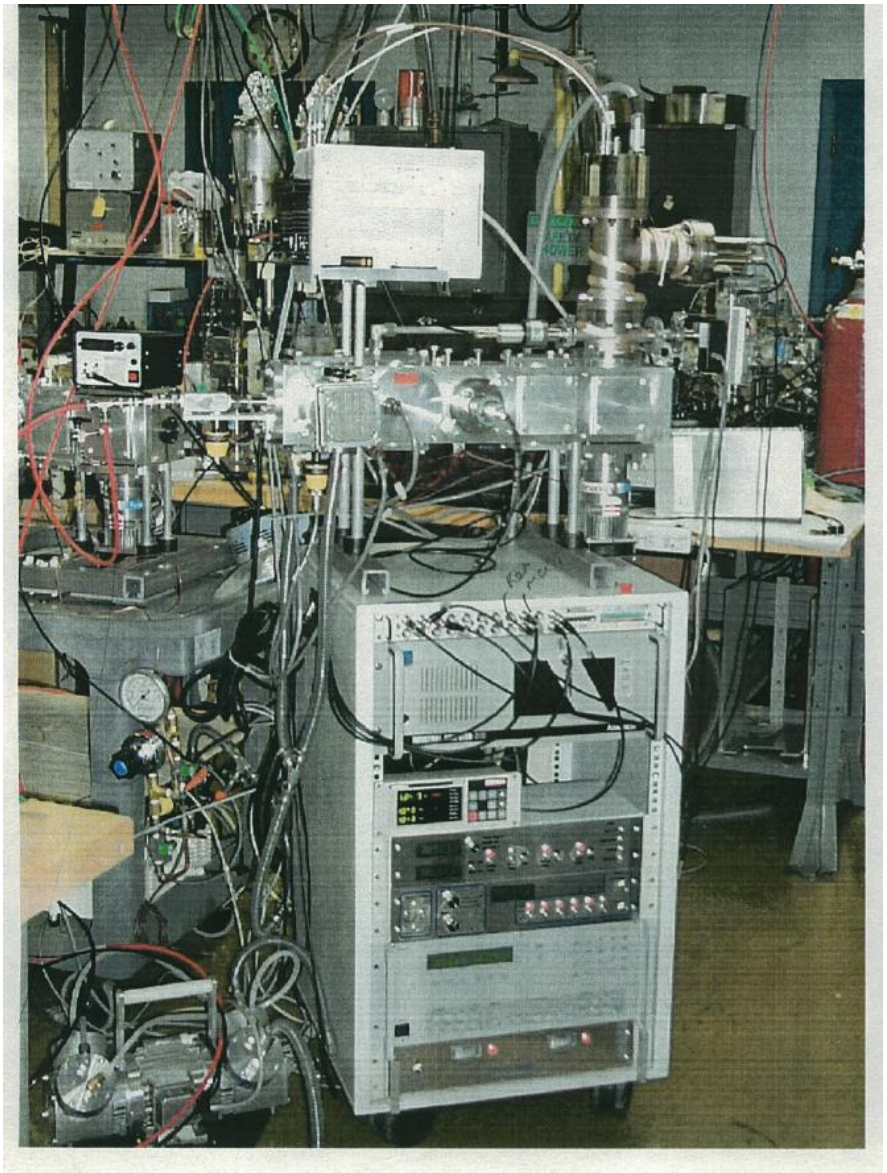
TAG and FIGAERO

Sat 9:19 AM

Instruments and Developments

AMS, mini AMS
QACSM, ToF ACSM
CIMS and Aerosol CIMS
IMS TOF
LAAPTOF
TAG AMS
Capture Vaporizer
Particle Lens
ePTOF Multiplex chopper

Something we may have delivered to the Manchester Group!

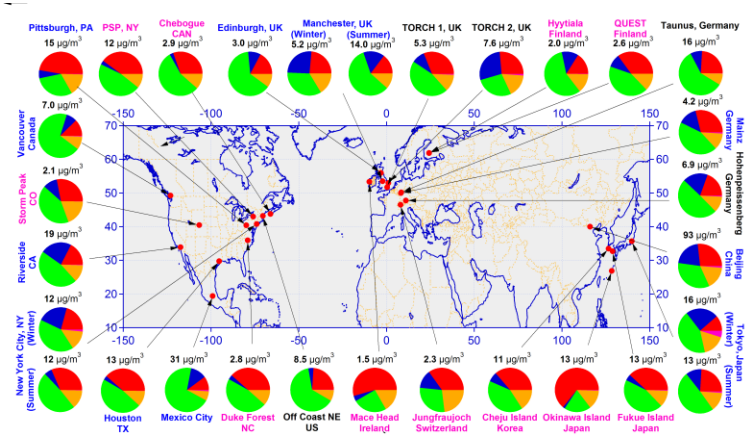


s/n: 255-002
June 2000

The Quad AMS

The work horse

Where the fundamental hardware and software ideas evolved.



Zhang et al, GRL 2007

Geneology and Chronology of AMS systems

QAMS	1995 – 2000+
CTOF AMS	2001
HTOF AMS	2002
QACSM	2004 – 2009+
SP HTOF AMS	2007
eTOF ACSM	2010
CTOF mAMS	2011
HTOF mAMS	*TBD*

Different colors are different vacuum systems

What's the Difference between an AMS, mini-AMS and an ACSM

If it has a chopper its an AMS

-*can do pTOF sizing*

If it doesn't have a chopper its an ACSM

-*no pTOF sizing, mass spectra only*

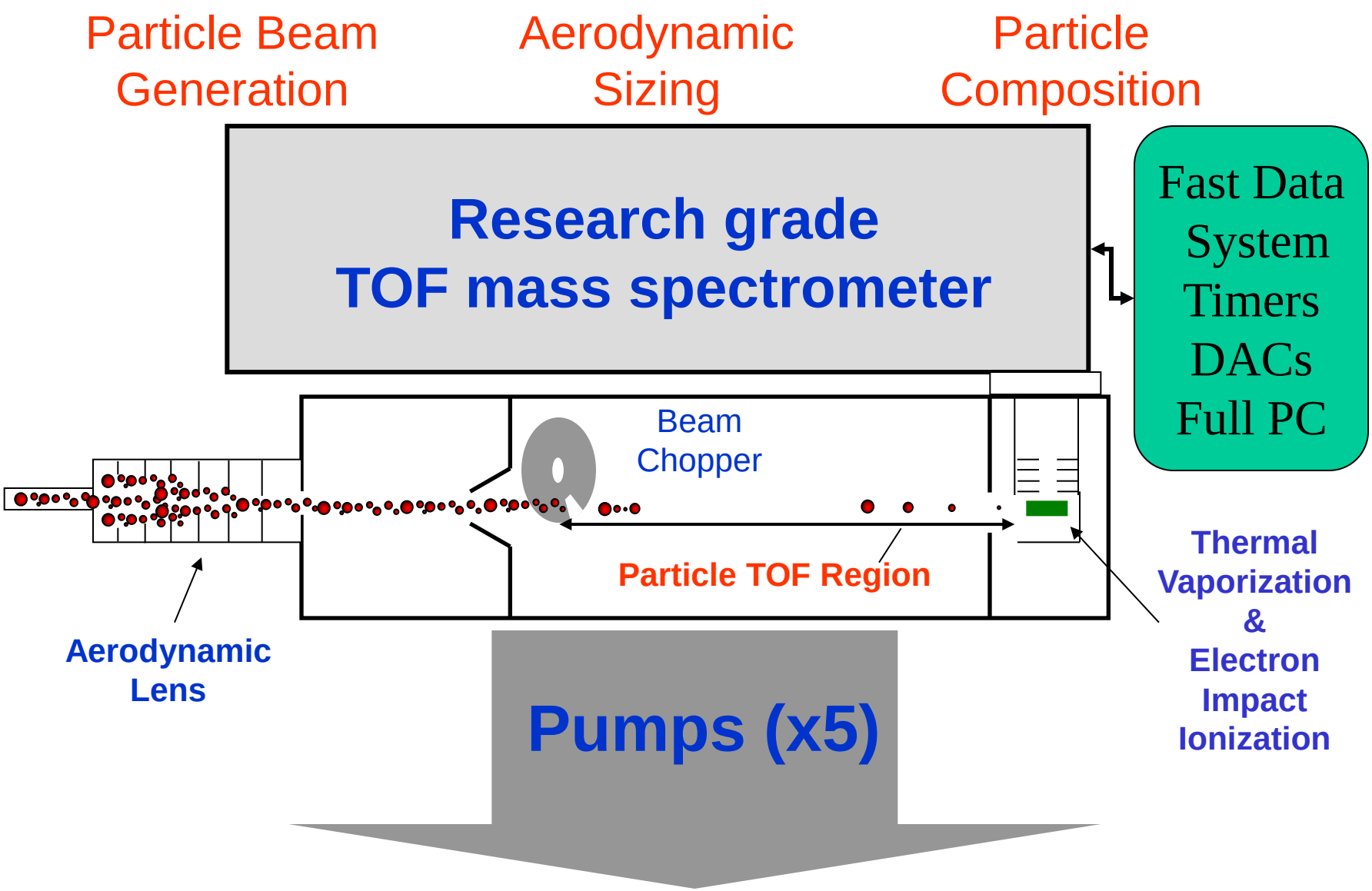
A mini-AMS is just a smaller AMS

-*a different vacuum system*

All AMS and ACSM Systems Share a Few Common Features

- Particle aerodynamic lens
- A differentially pumped high vacuum system, *efficient gas-particle separation*
- Particle vaporizer
- Electron impact ionization source
- *Mass spectrometer ► performance/Cost*

Aerosol Mass Spectrometer



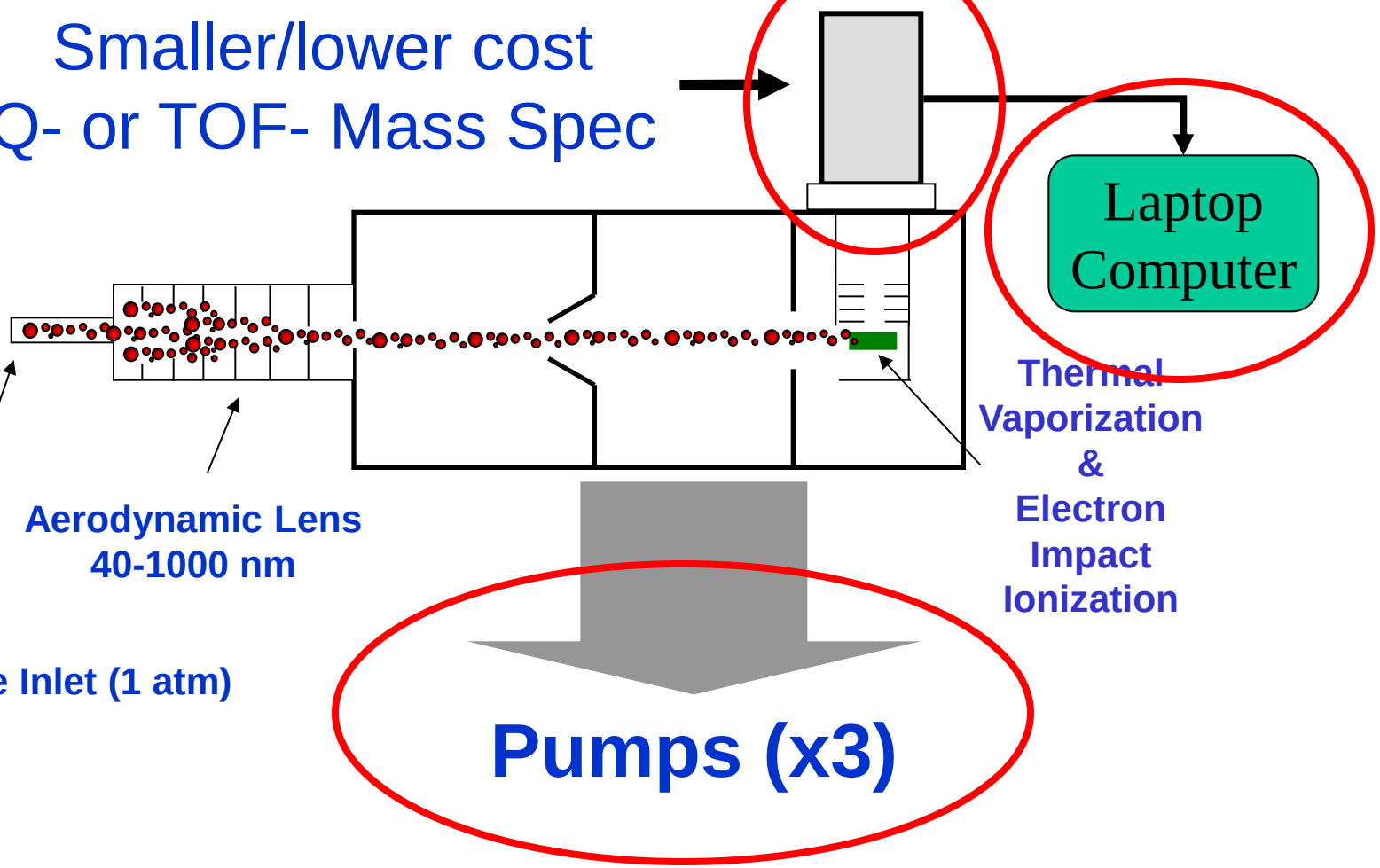
Aerosol Chemical Speciation Monitor

Particle Beam Generation

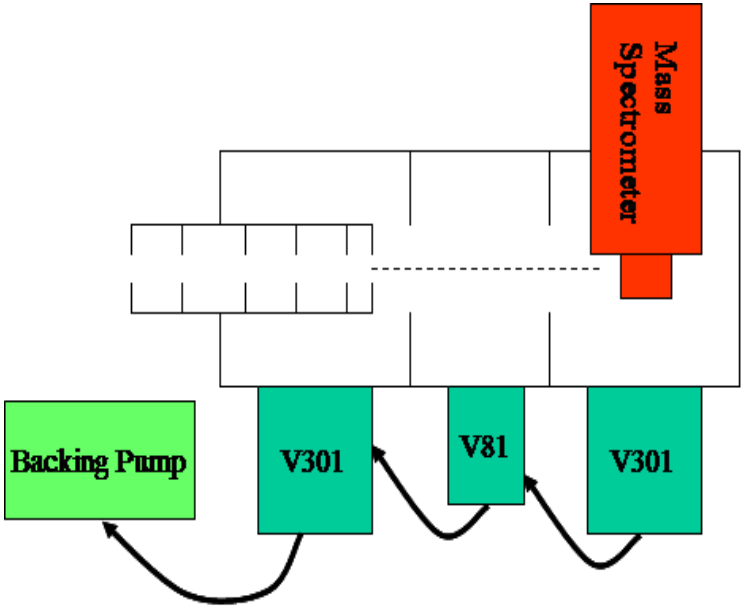
No Sizing

Particle Composition

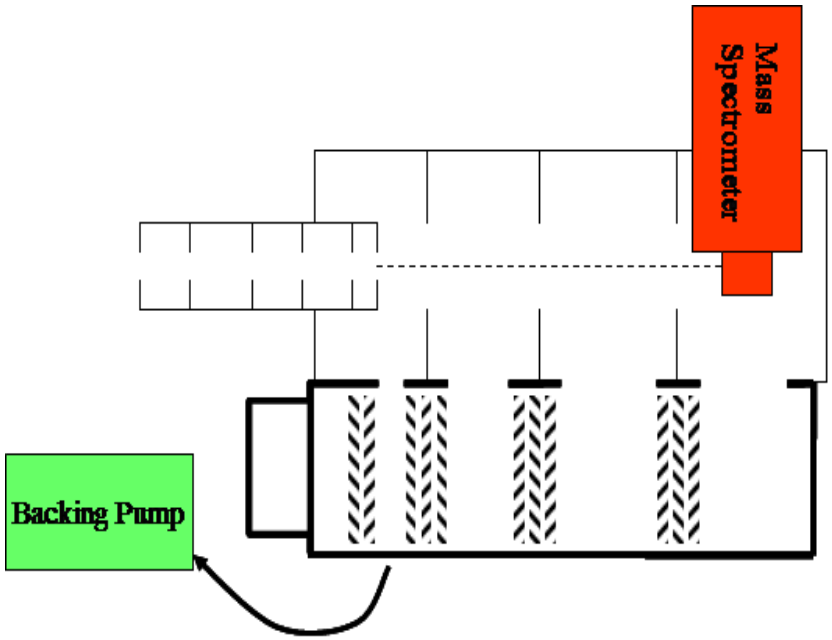
Smaller/lower cost
Q- or TOF- Mass Spec



Two Different Vacuum System Designs



QACSM
discrete turbos



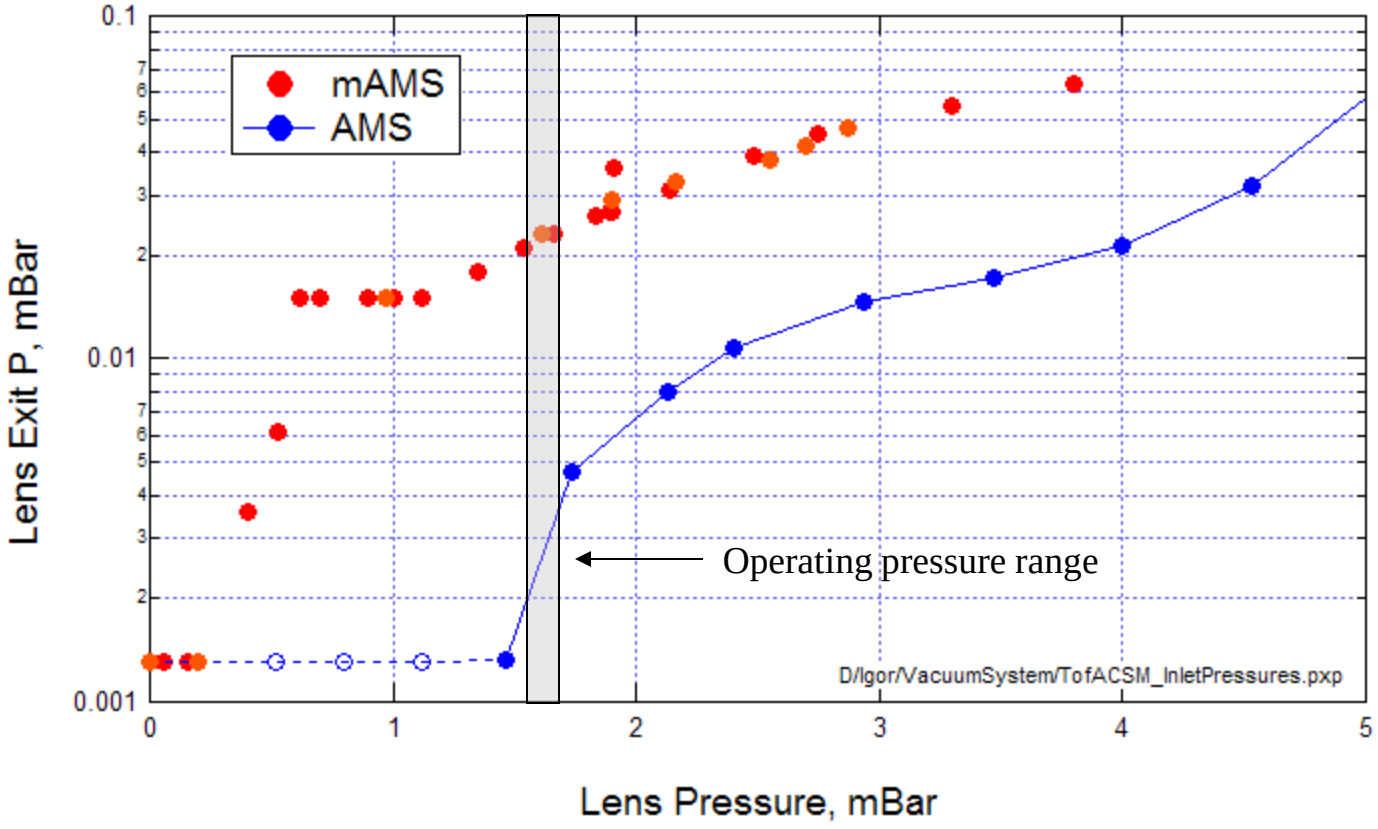
TOF ACSM and mAMS
Split flow turbo

Pumping speeds (L/s)

300 80 300

40 170 135 160

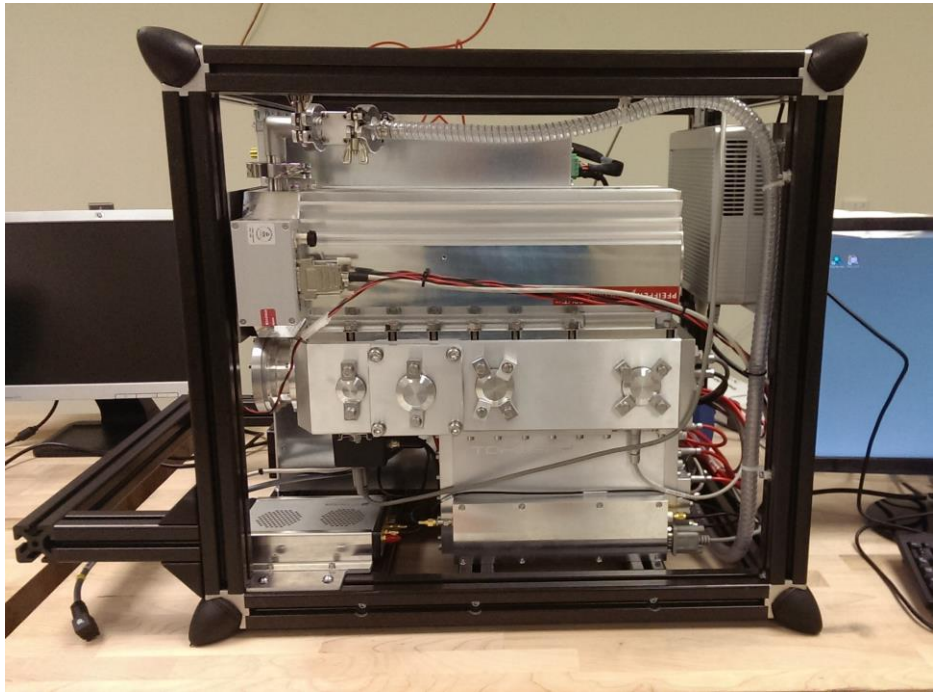
Key Difference Between the mAMS/ACSM and AMS Systems is Pumping at the First Stage



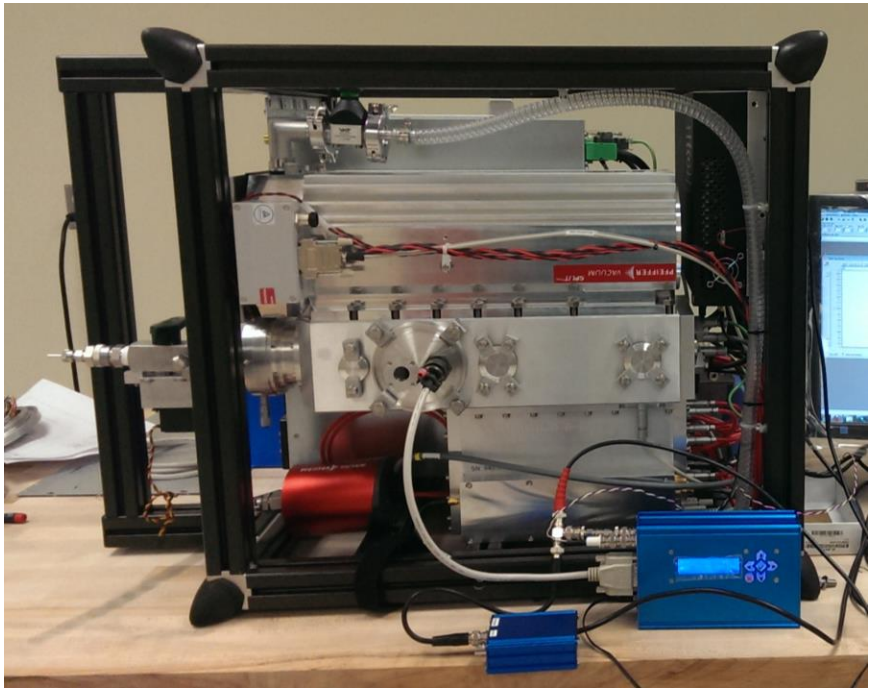
Reduced particle transmission at small size end

Recent mAMS and ACSM Systems

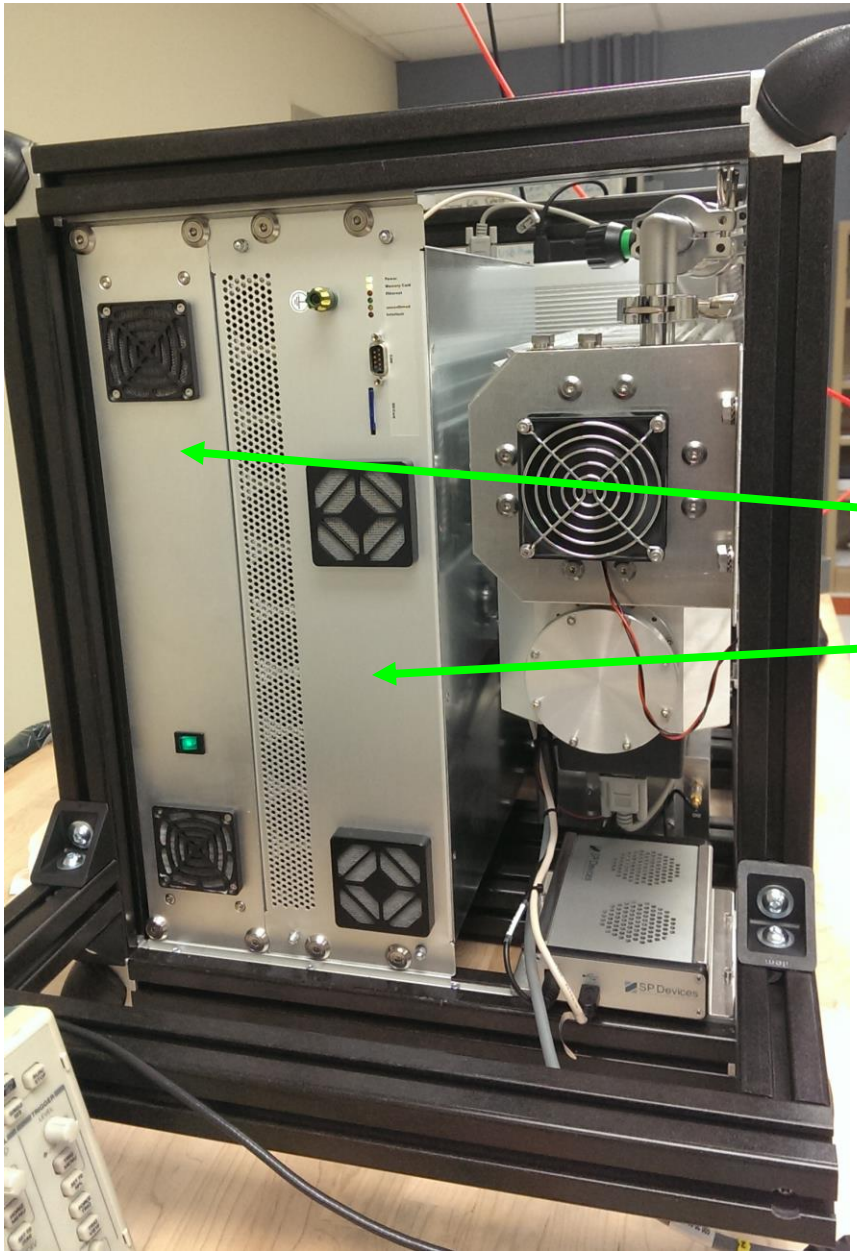
eTOF ACSM



cTOF mAMS



Differences between ACSM and mAMS are the chopper and the DAQ system



The new TOF ACSM and mAMS systems have a new generation of electronics and TPS systems.

- Giraffe
- TPS2

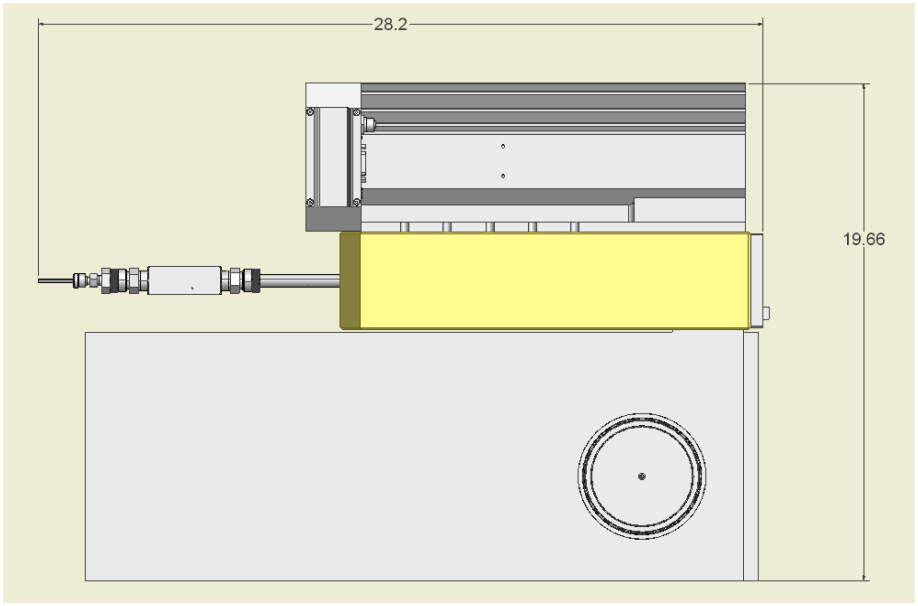
Size: 23”H x 25”W x 19”D

Weight: 160 pounds

Power: ~300W

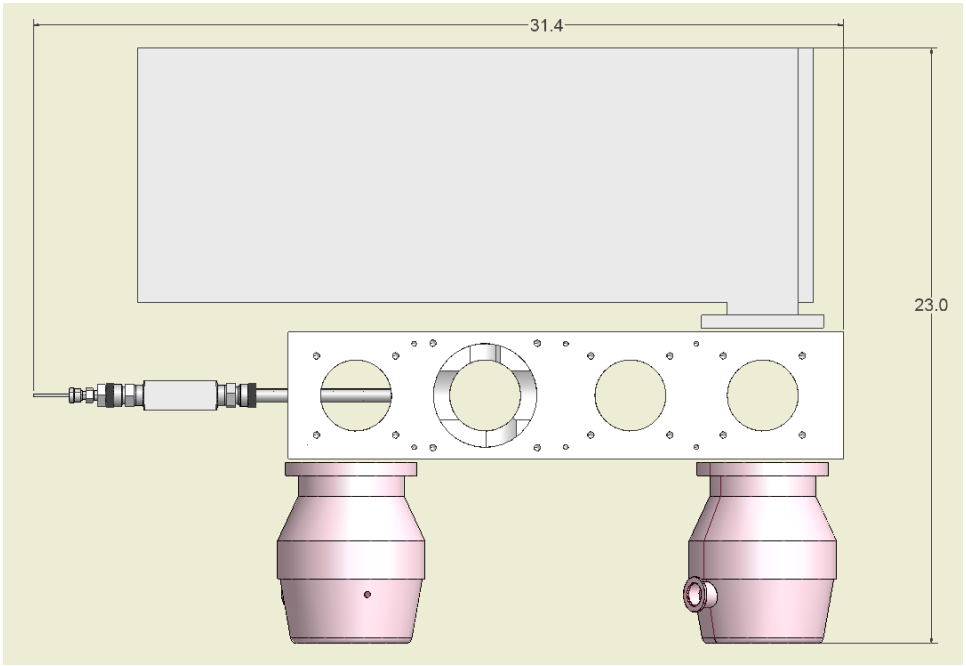
Is this the next generation AMS system?

Can we put a mini-Vacuum system on an HTOF?



Overall length

28.2” (720 mm)



31.4” (800 mm)

Some Open Issues to be Addressed with mAMS System

- Software development of AMS DAQ system

  Different sw paths to support AP240, ADQ1600, TPS 1&2, Giraffe, different analog and digital I/O systems.

- Performance Evaluations

  Particle transmission, reduced pumping speed at lens exit leads to collisional defocusing of sub 100 nm particles.

  Shorter pTOF flight path, is the trade off with size resolution acceptable.

- Vacuum chamber compatibility for optional modules

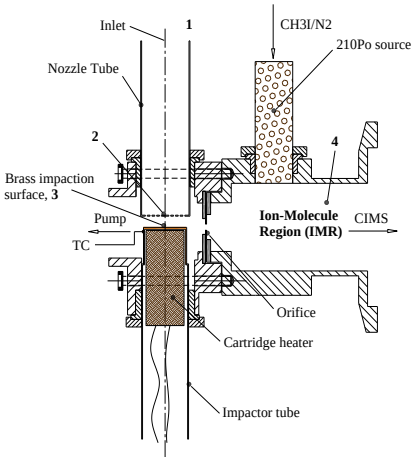
  mini-chamber does not currently support light scattering, soot particle laser module, beam width probe. Use with HTOF mass spectrometer.

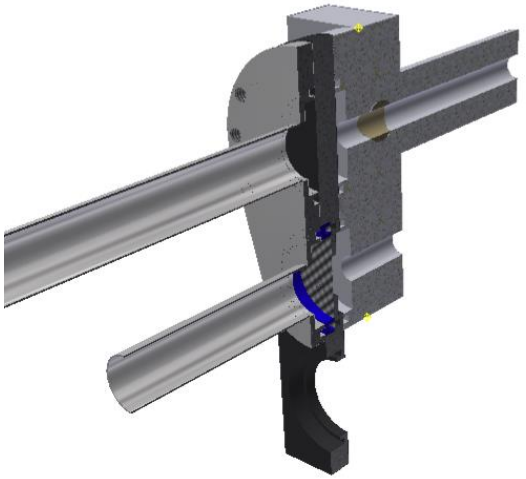
Aerosol composition with the CIMS instrument
Particle collection and thermal vaporization

MOVI - obsolete. Aerosol collection by impaction. Complications with particle and sticky gas wall interactions.

FIGAERO – new collector module. Aerosol collection by filtration. Separate sampling lines for gas and aerosol

EyeOn - A hardware and software control system for the collector module

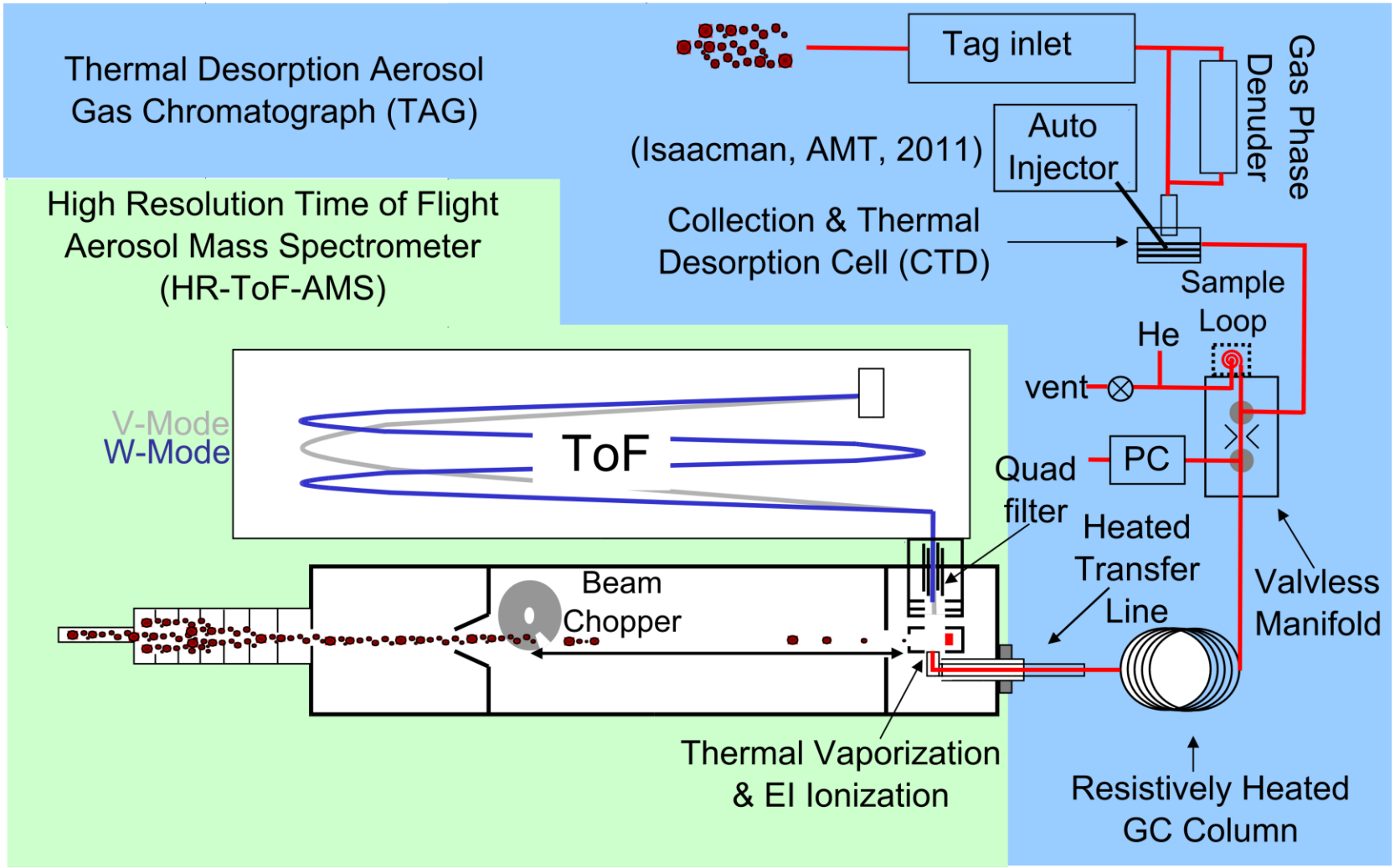




UW - Joel Thornton, Claudia, Felipe

TAG-AMS

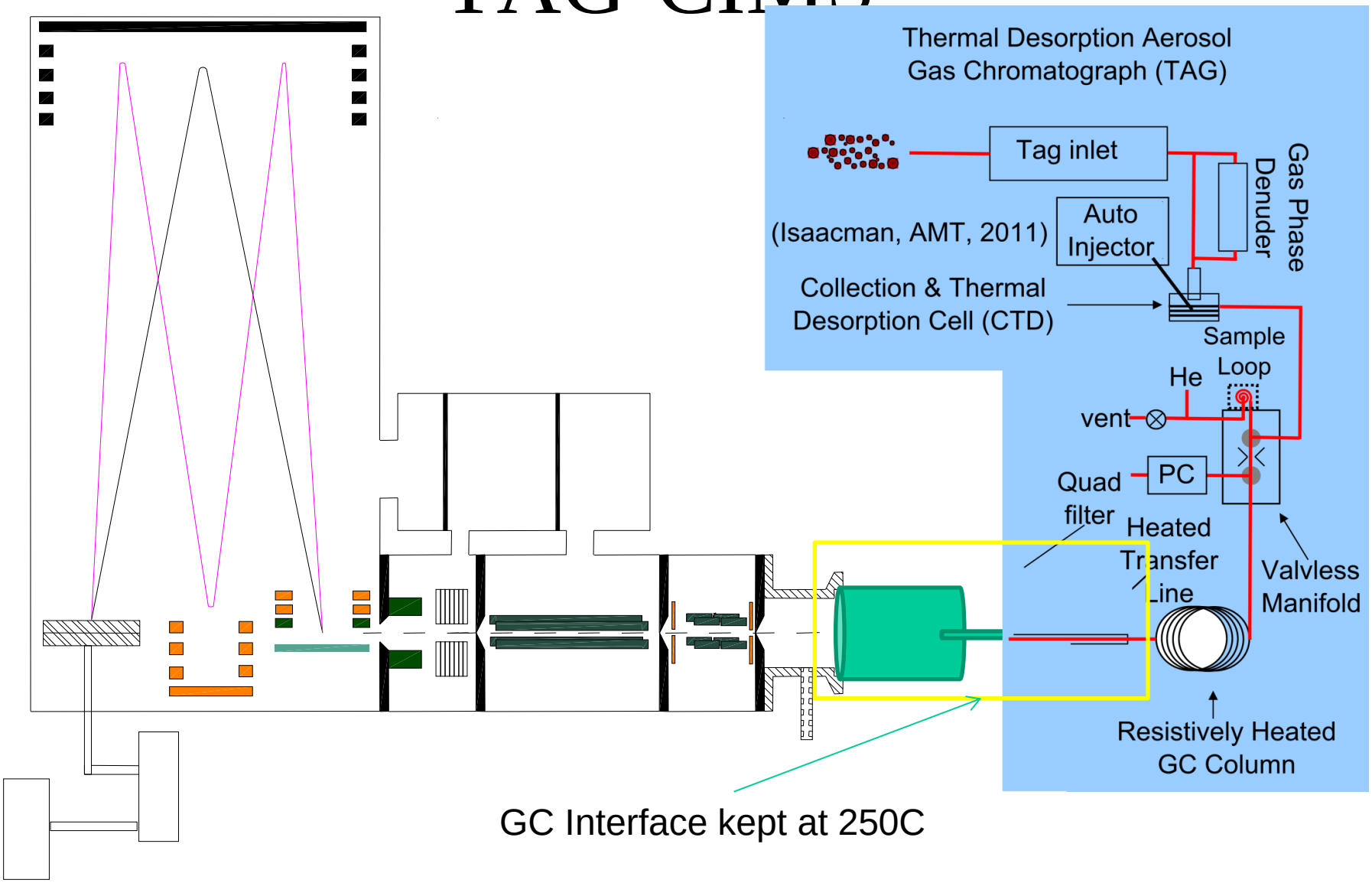
Thermal Desorption Aerosol GC/MS



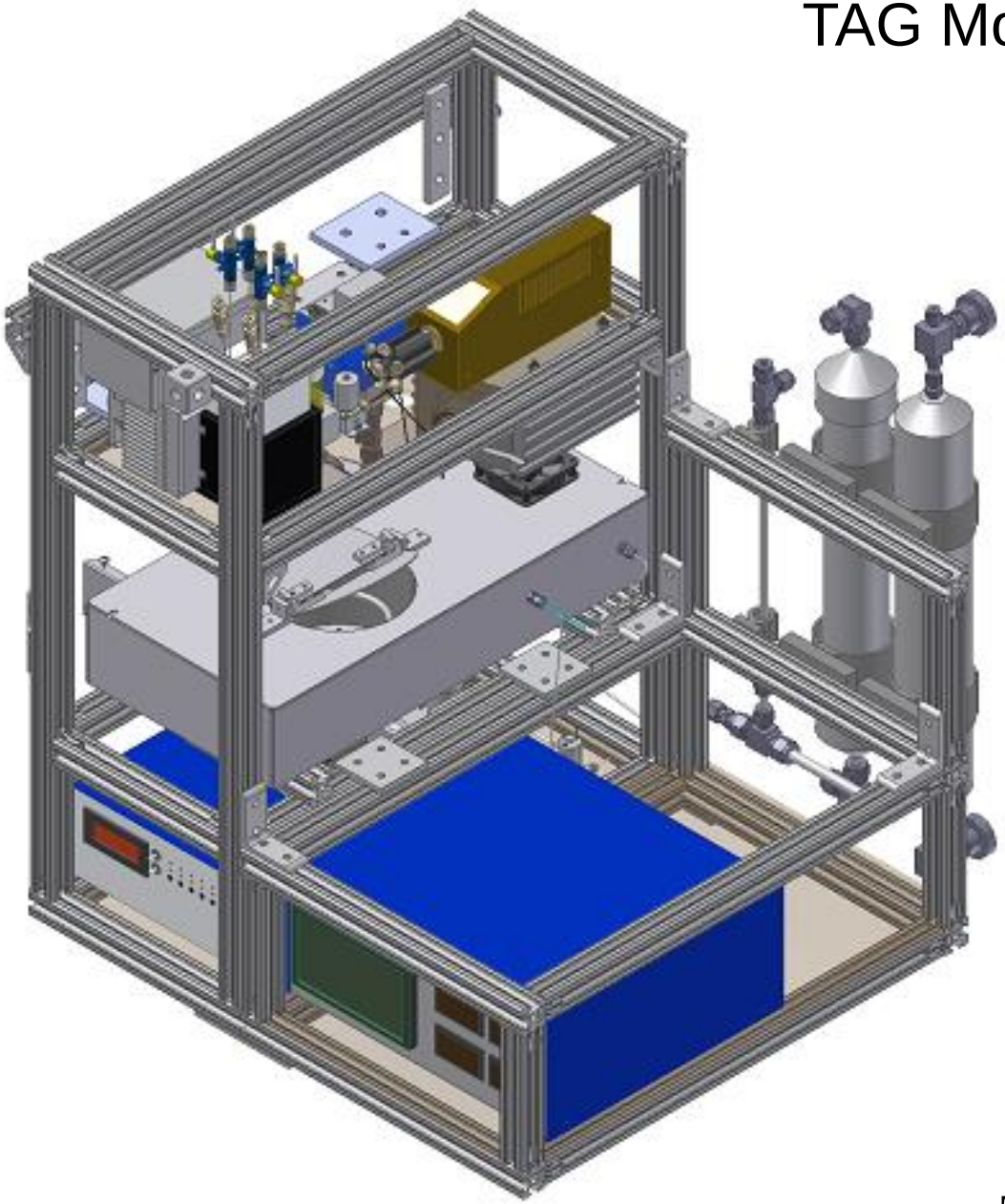
September 4, 2010

Williams et al. 2006 (UCB)

TAG-CIMS


Thermal Desorption Aerosol
Gas Chromatograph (TAG)
Tag inlet
Gas Phase
Denuder
(Isaacman, AMT, 2011)
Auto
Injector
Collection & Thermal
Desorption Cell (CTD)
Sample
Loop
He
vent
Quad
filter
PC
Heated
Transfer
Line
Valvless
Manifold
Resistively Heated
GC Column
GC Interface kept at 250C

TAG Module



Thorsten Hohaus