



FTMS – High Resolution MS

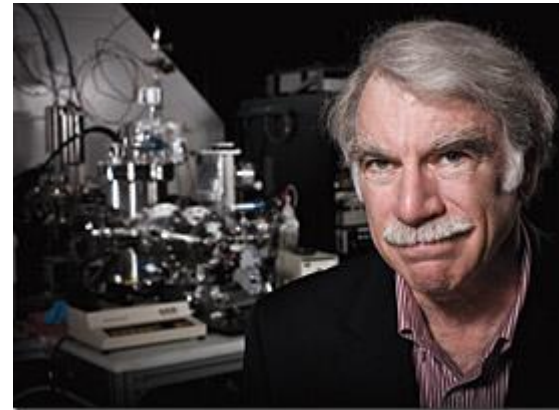
Merry go round...

FTICR-MS

- Fourier transform mass spectrometry



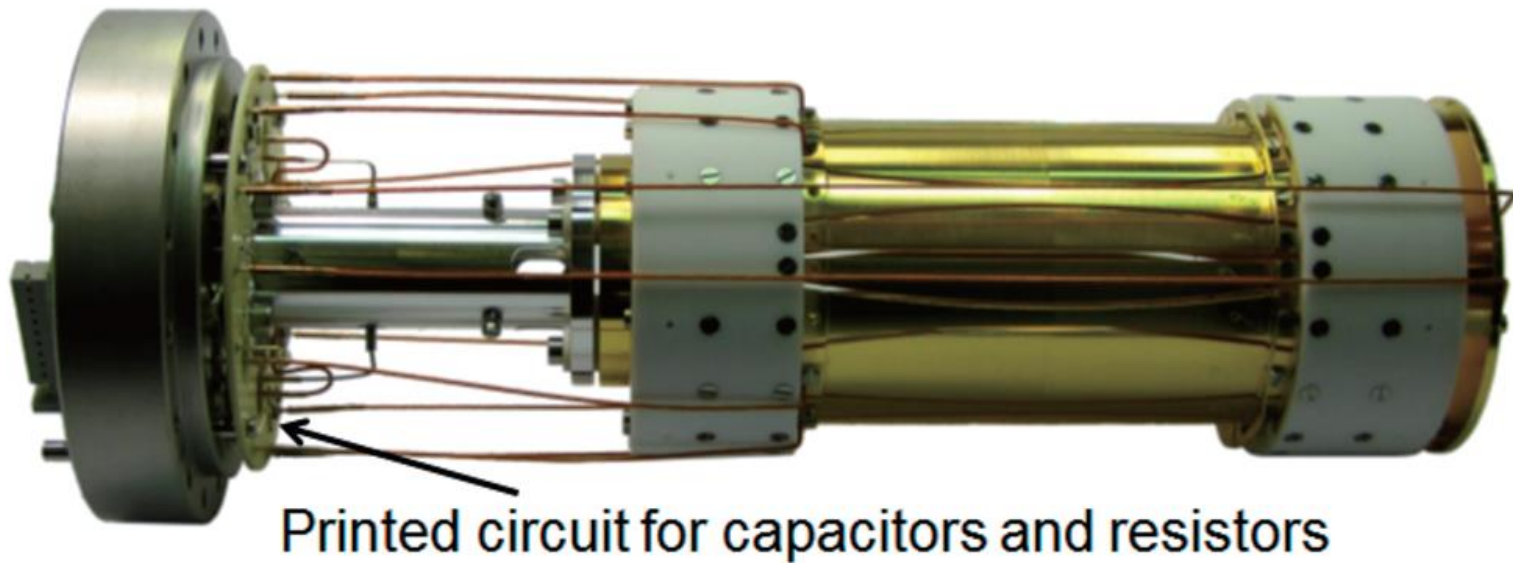
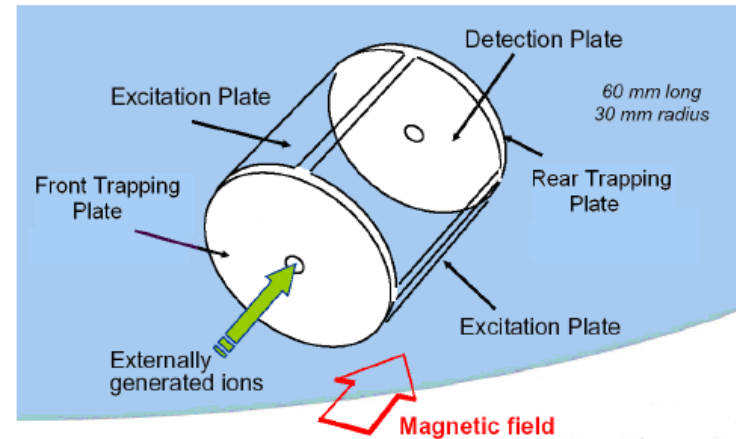
21 Tesla (Earth's mag field... $50 \mu\text{T}$)



Allan Marshall 1978
FTICR-MS Invention

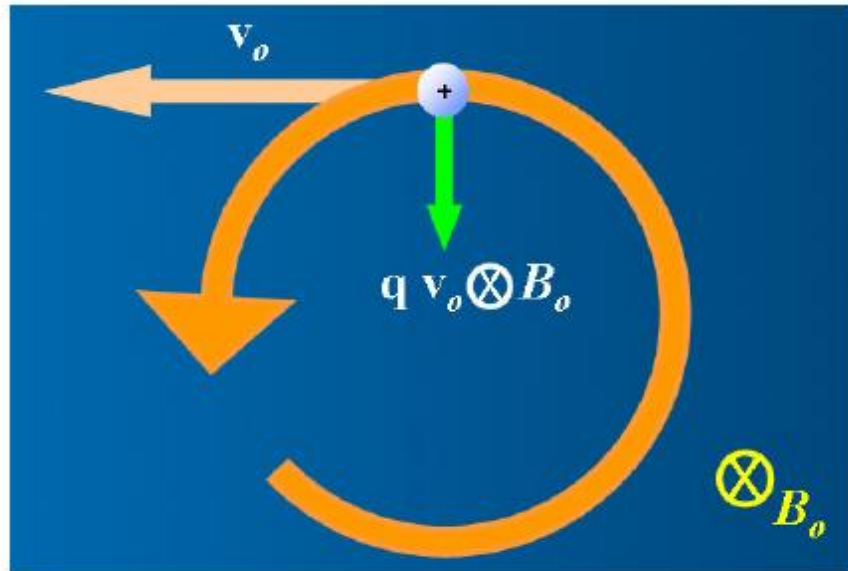
National High Field Lab

FTICR Cell



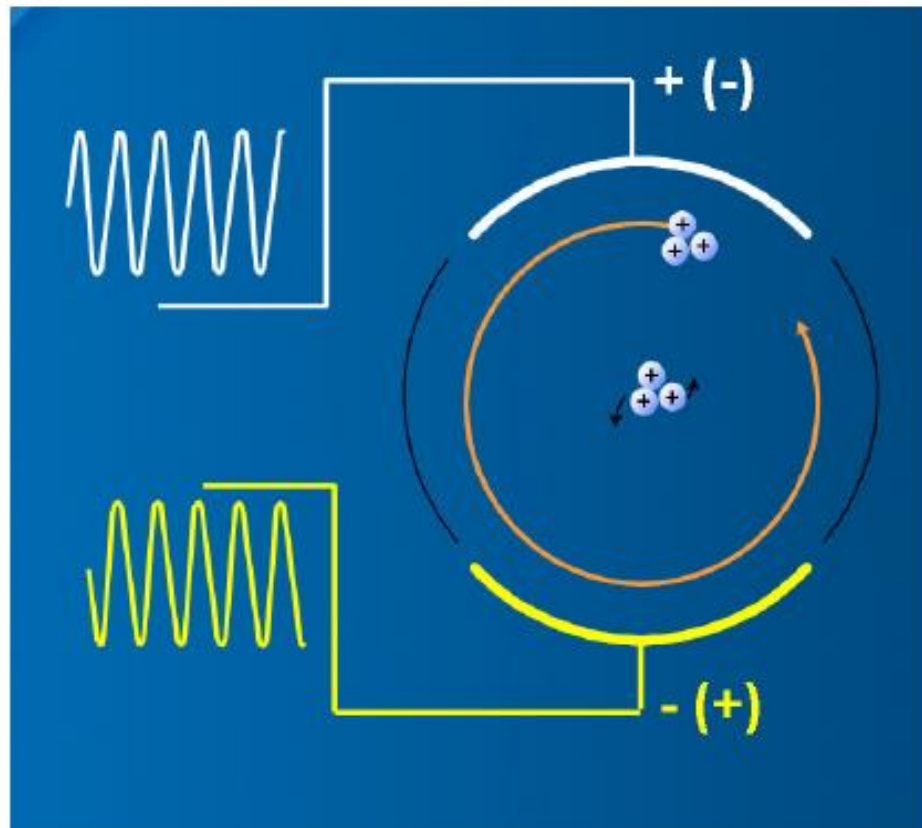
FTICR: Operation principle

$$\omega_c = \frac{z}{m} B_o$$

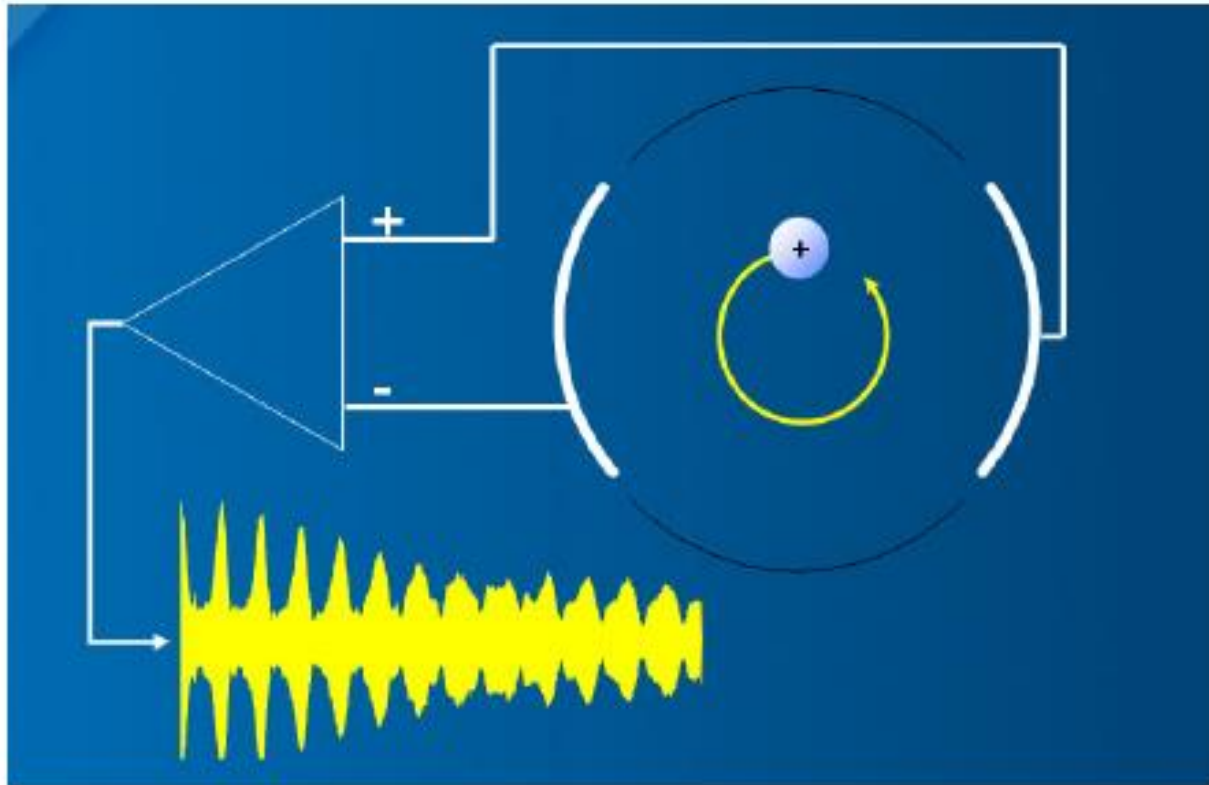


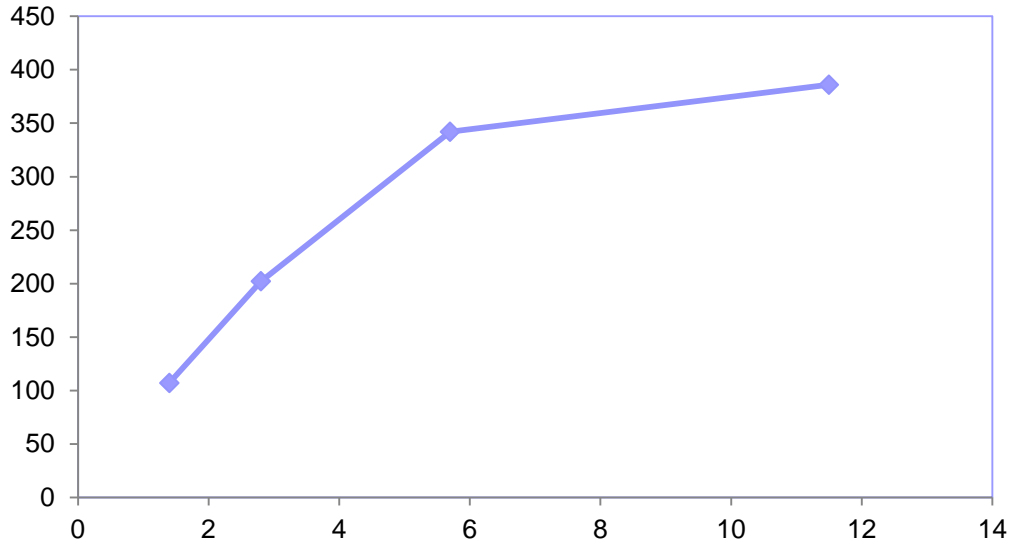
Fourier transformed ion-cyclotron resonance mass spectrometry

Exciting ions

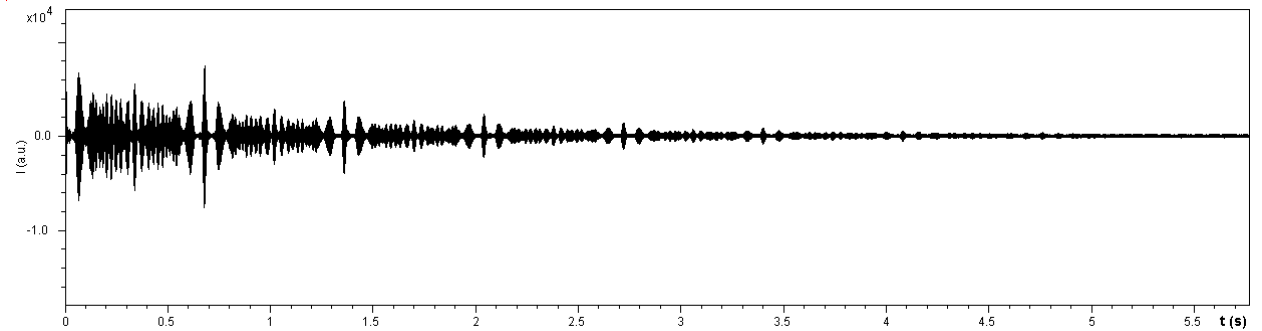


Detecting ions

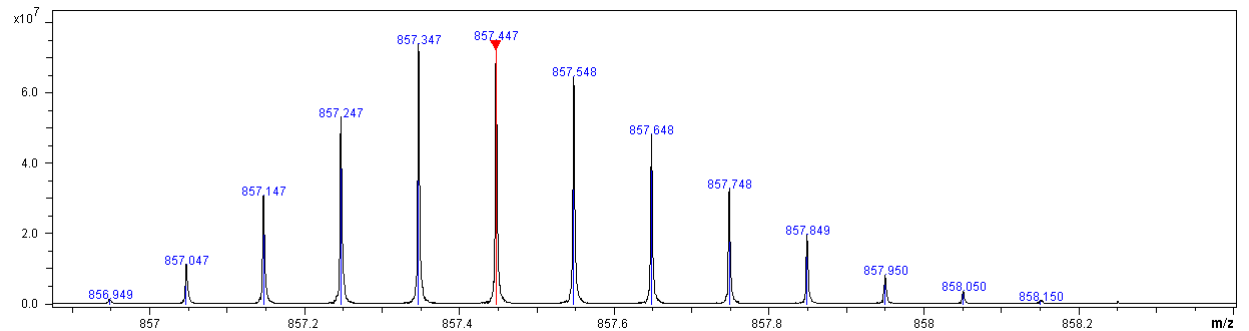




Limits of resolving power

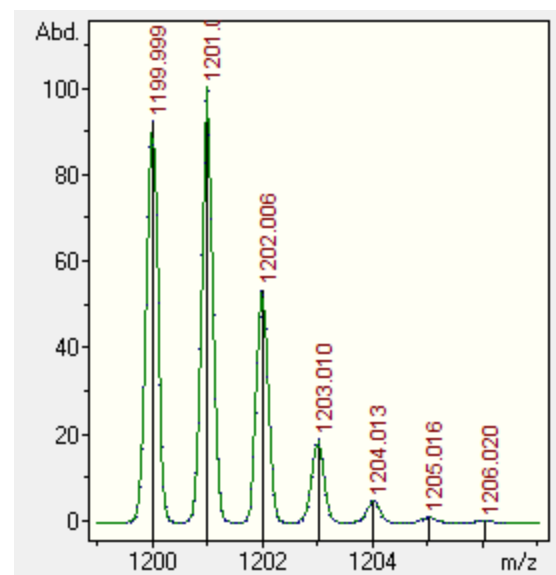
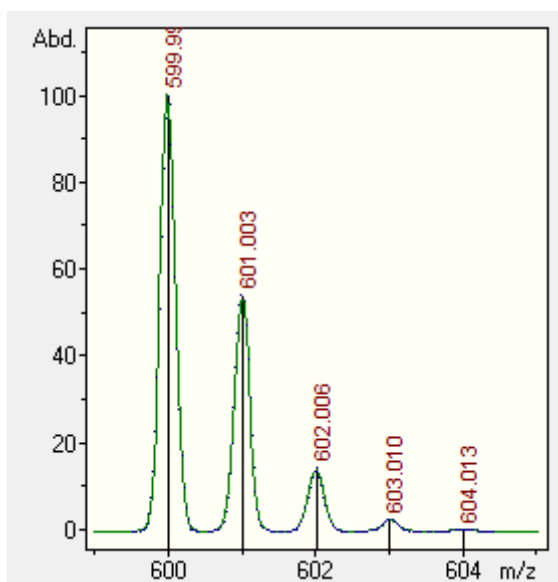


Signal decay in time



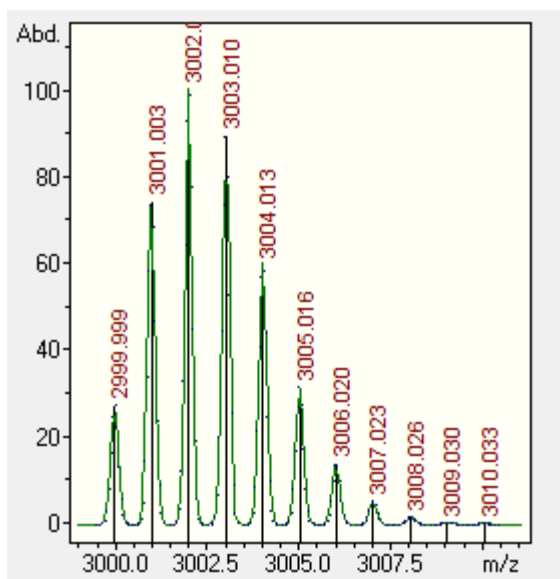
Isotopic distribution

Increase
Number of C

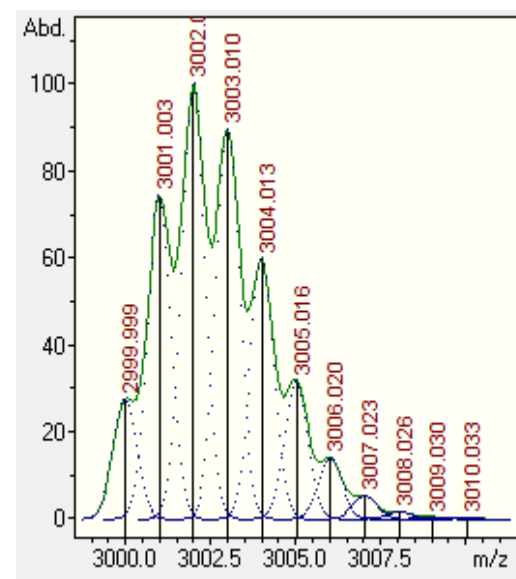


Why high resolution?

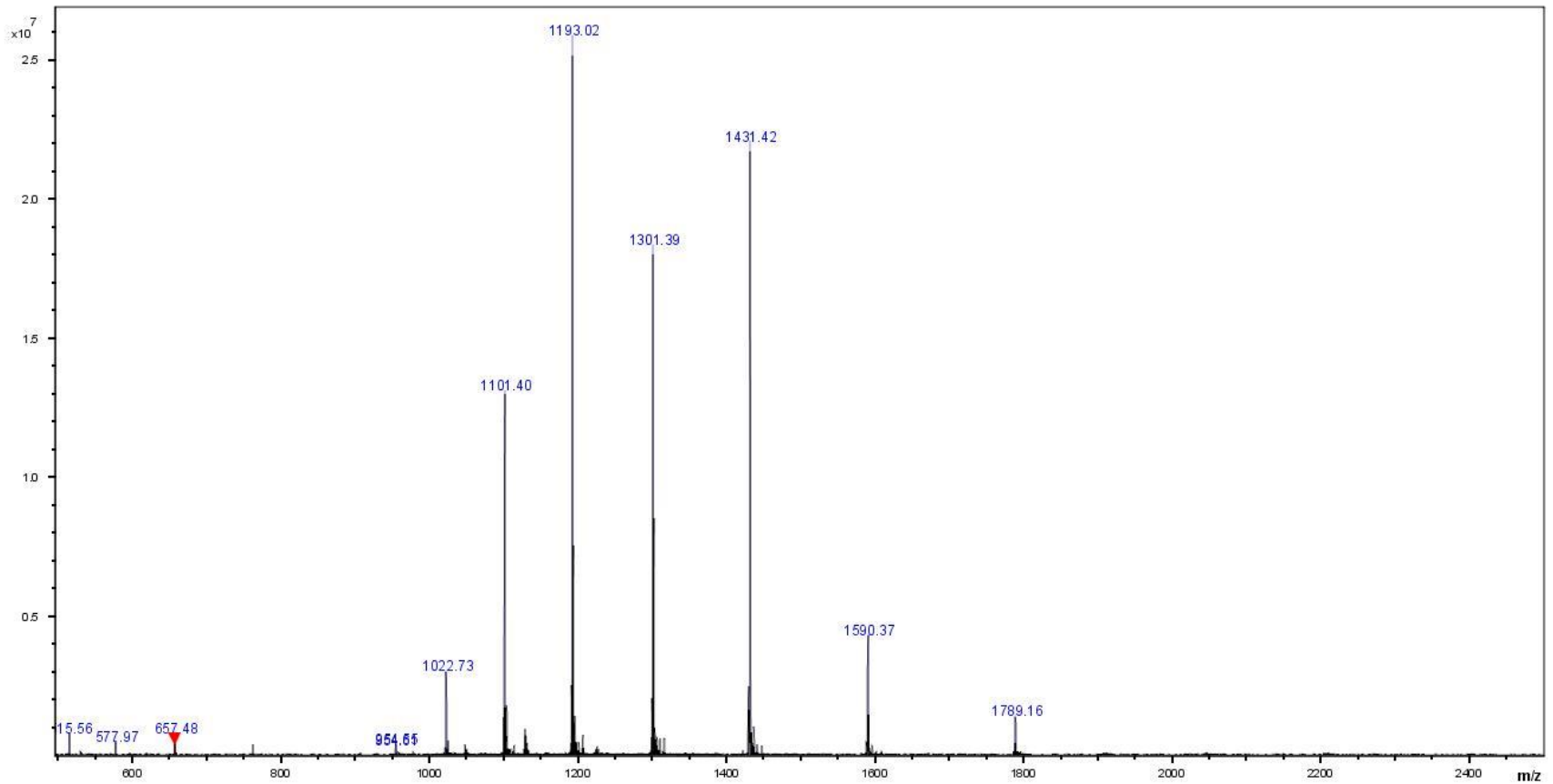
Hi Rez



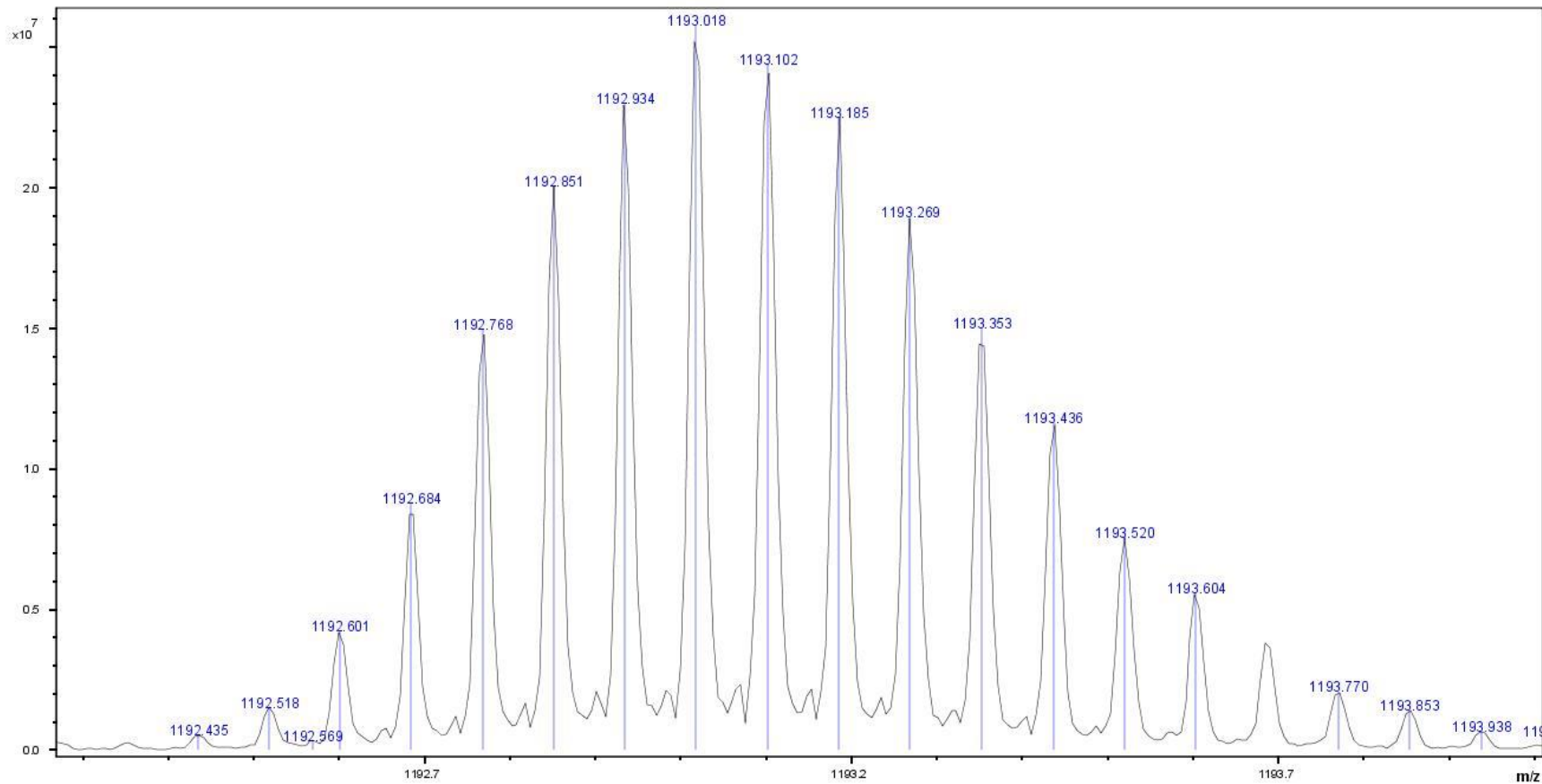
Low Rez



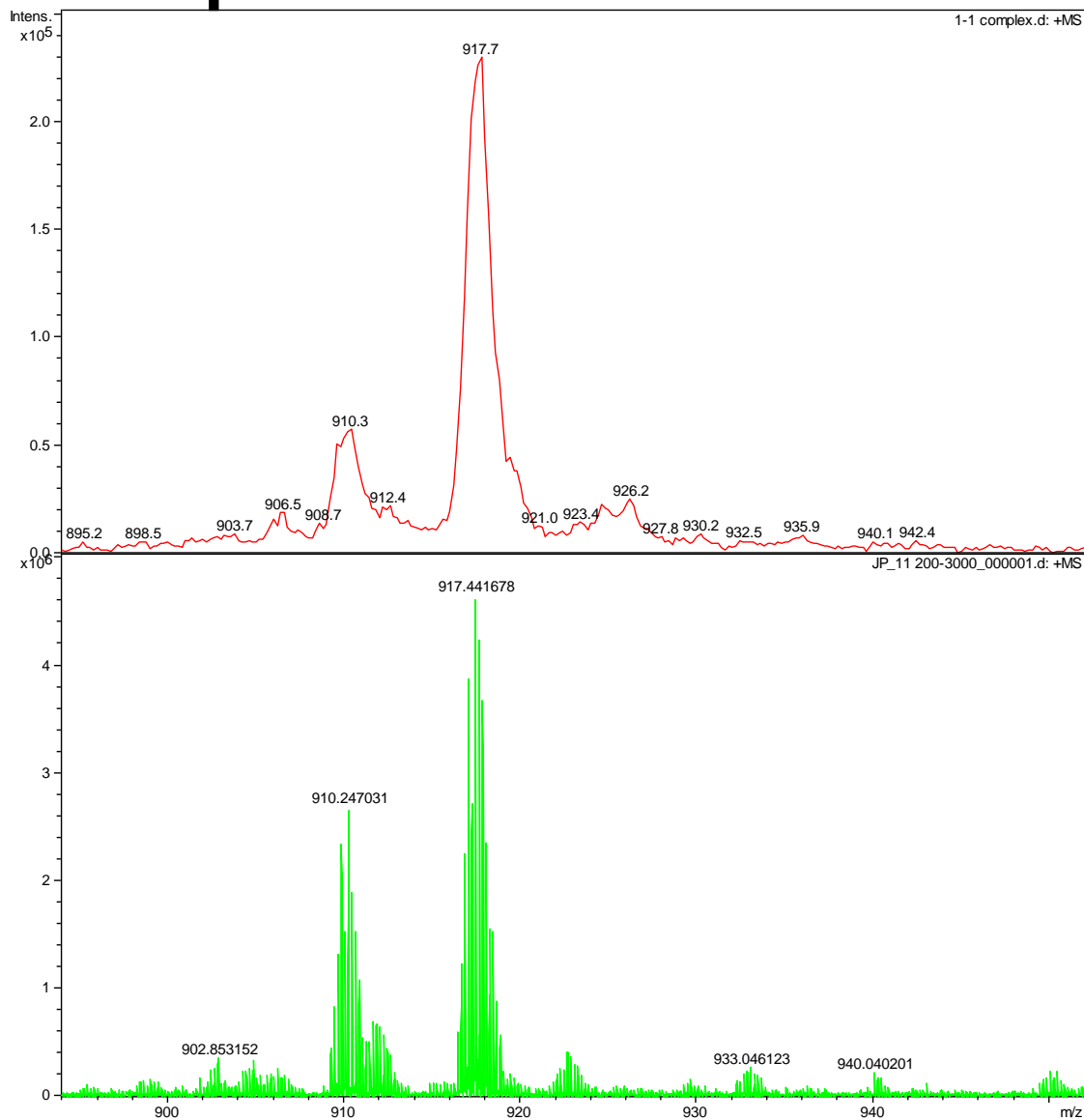
Protein, ESI



Isotopic pattern



Ion trap vs FTICR



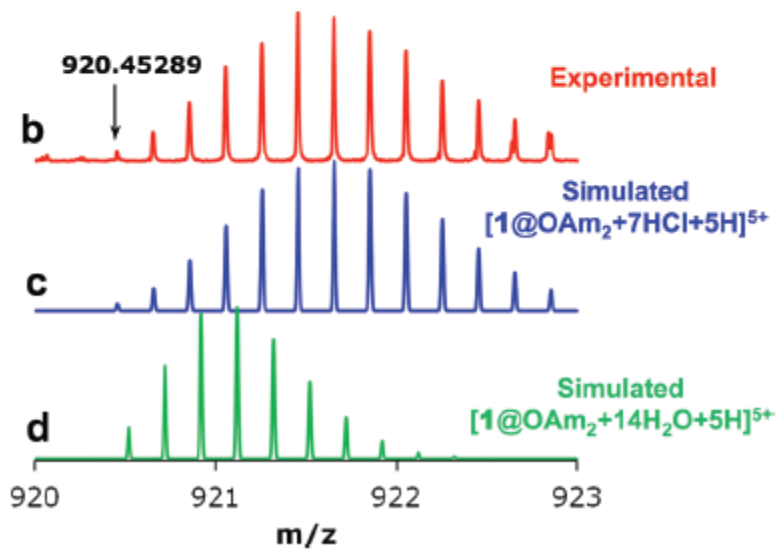
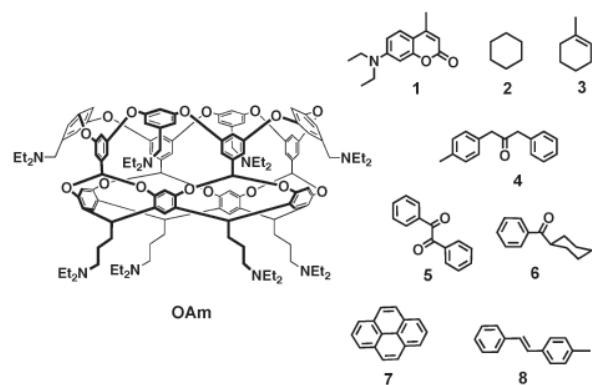
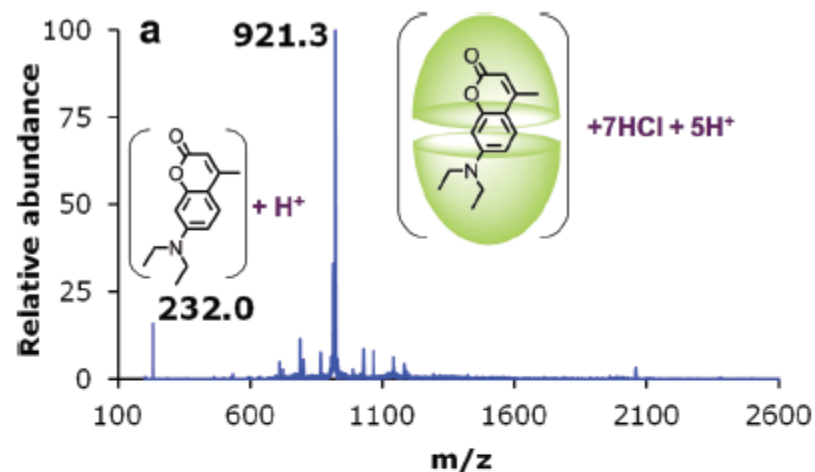
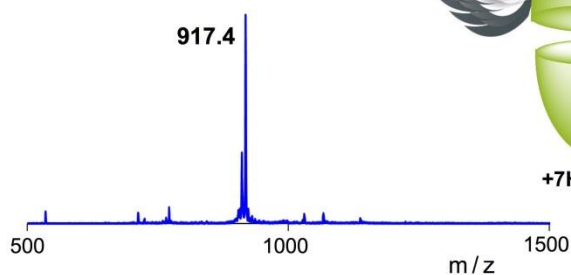
Low Rez

Hi Rez

In Gas Phase



ESI-MS Spectrum



Capsular Complexes of Nonpolar Guests with Octa Amine Host Detected in the Gas Phase

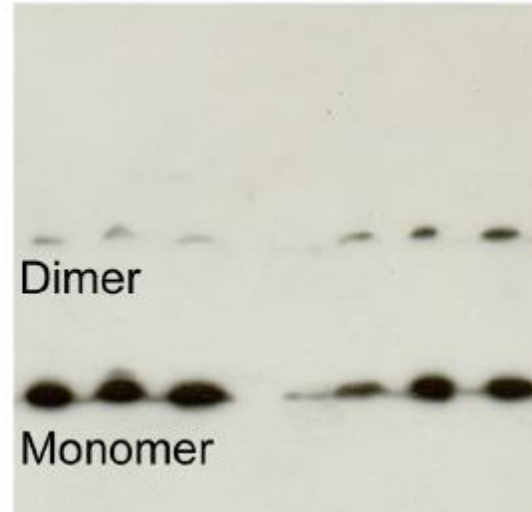
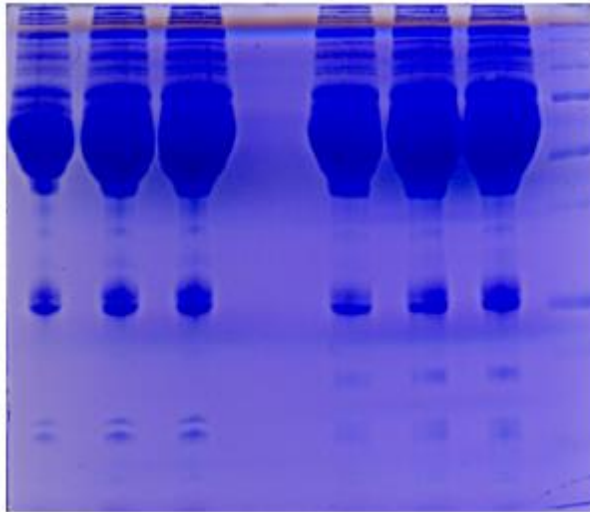
TTR variants in human plasma

Control

FAP

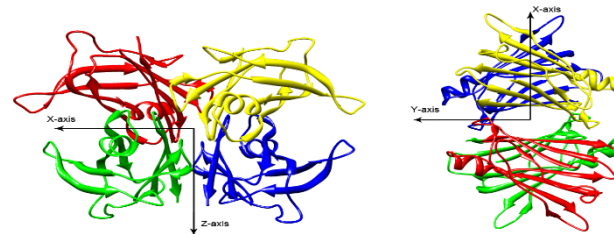
Control

FAP



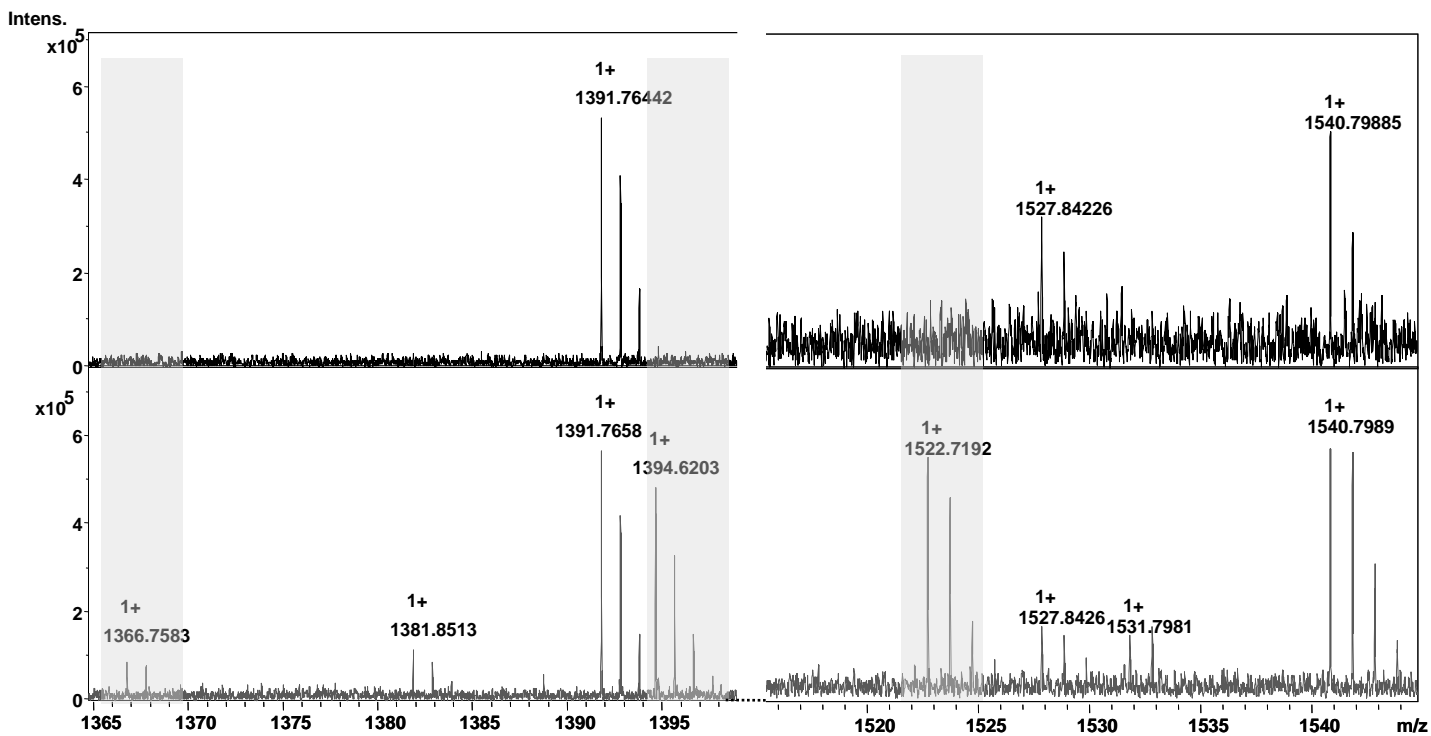
Trypsin hydrolysis

MALDI-FTICR analysis

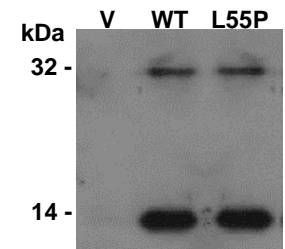


Human TTR in yeast

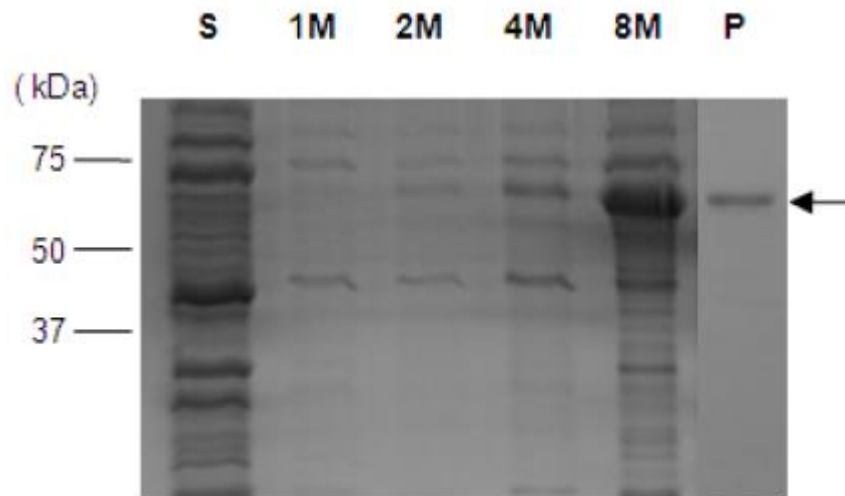
B



A



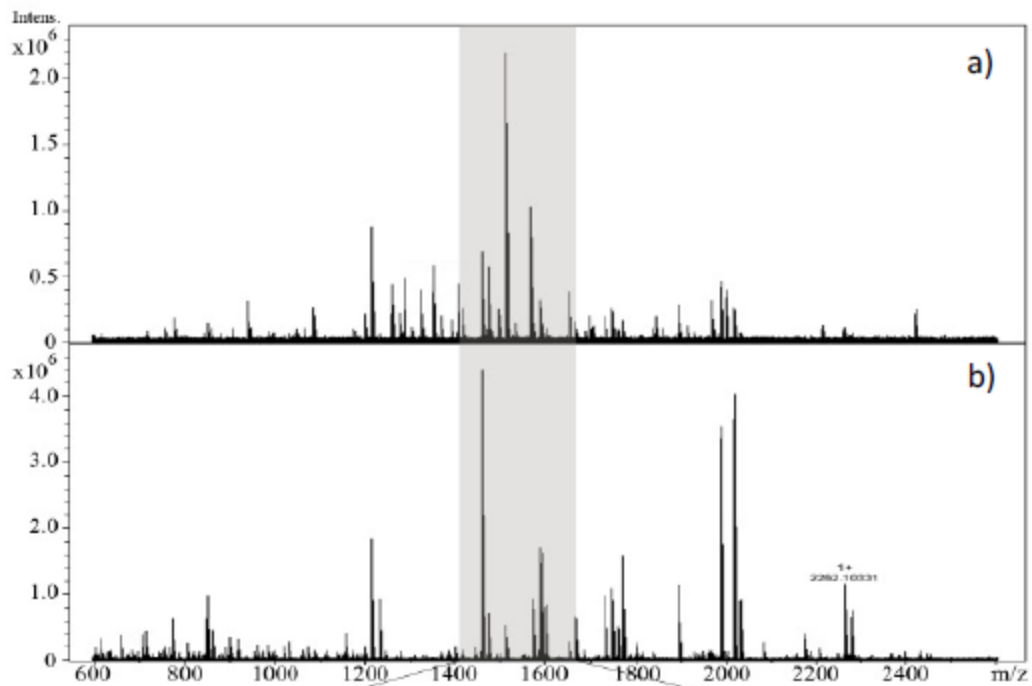
L. Infantum NOS



Is *L*NOS there?

Western

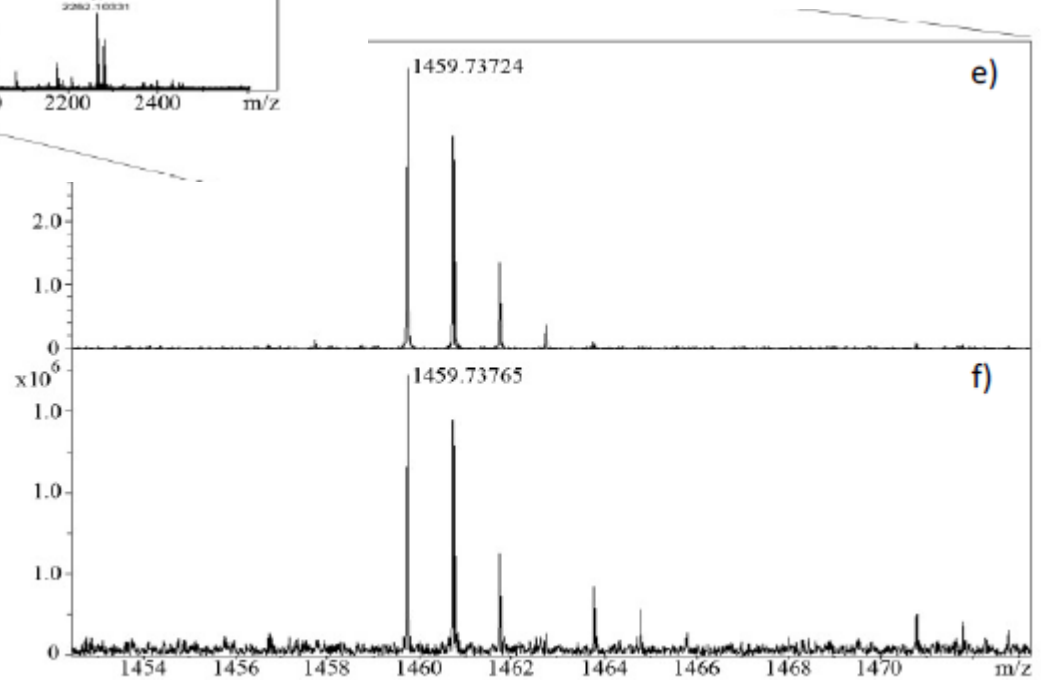
Enzyme Activity



Recombinant

L. Infantum extract

MALDI-FTICR

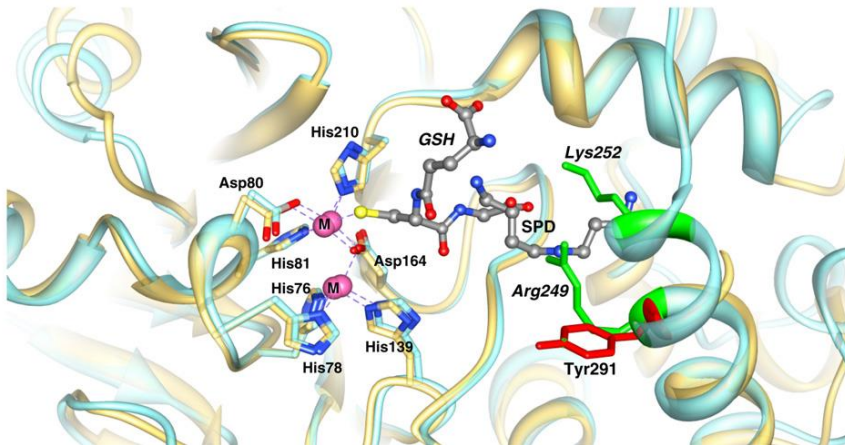


Mutations LiGLO2

A

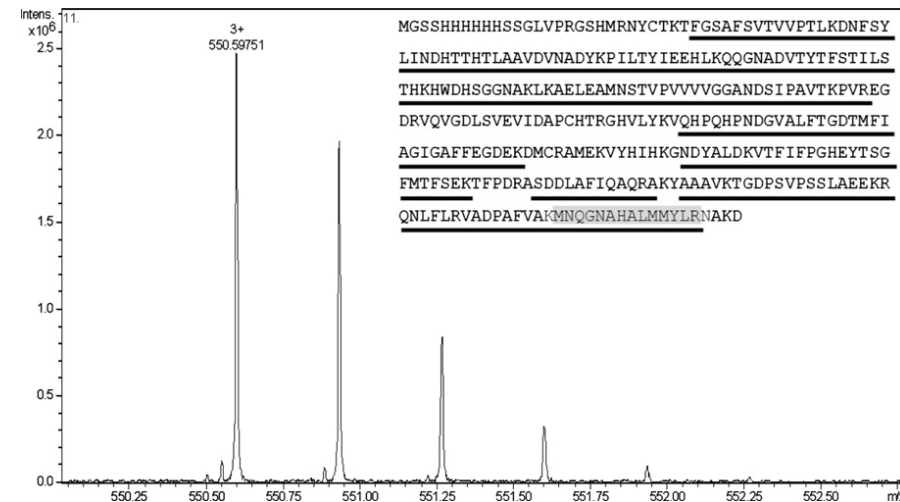
<i>L. infantum</i> GLO2	... G N A H A L M M Y L ²⁹¹ Y N A C D ²⁹⁴
<i>L. infantum</i> mutated GLO2	... G N A H A L M M Y L ²⁹¹ R N A K D ²⁹⁴
<i>H. sapiens</i> GLO2	... T D P V T T M R A V ²⁴⁹ R R E K D ²⁵² ...
	↑ ↑

B



Structural information

MS molecular information



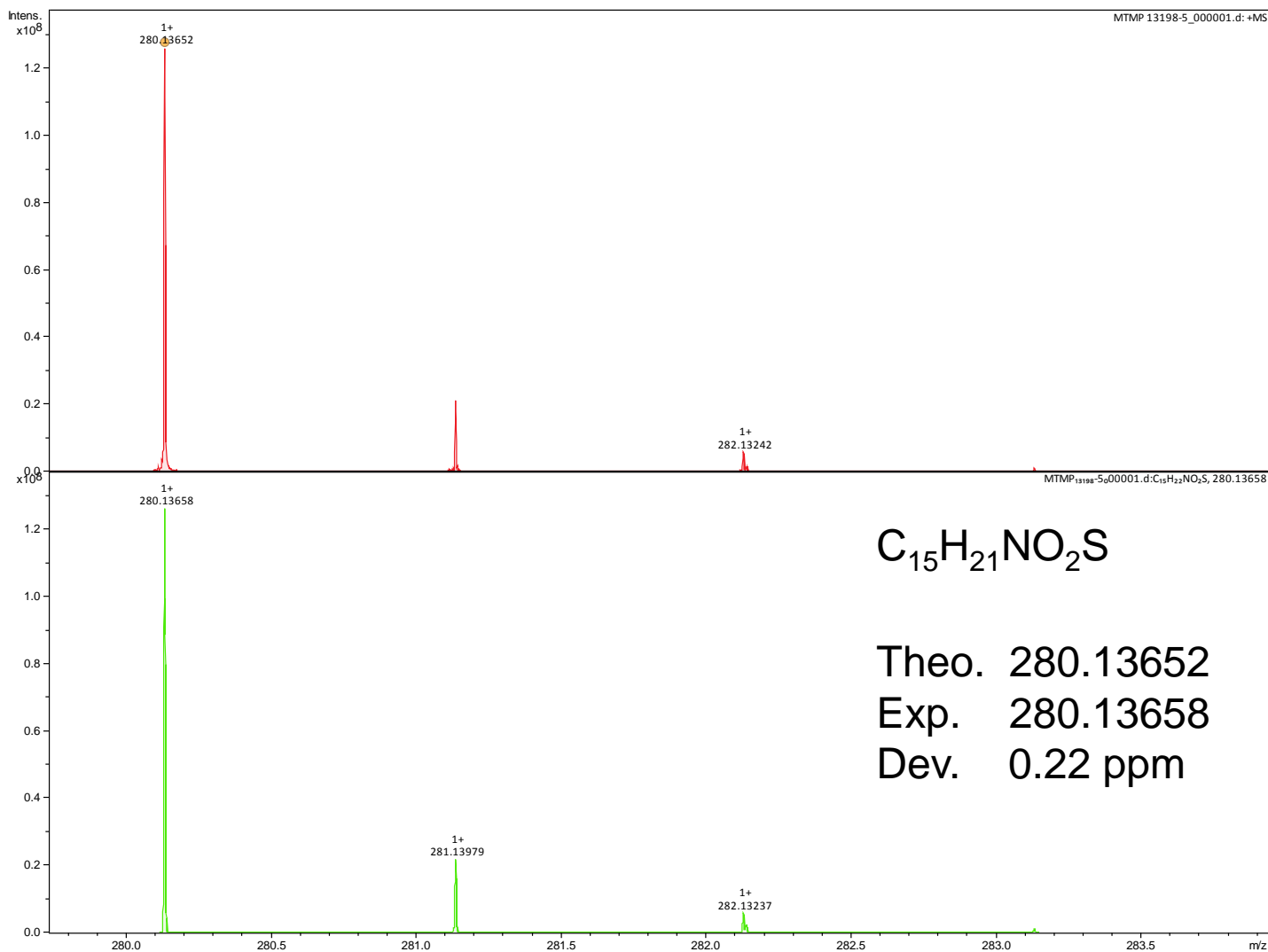
Extreme resolution

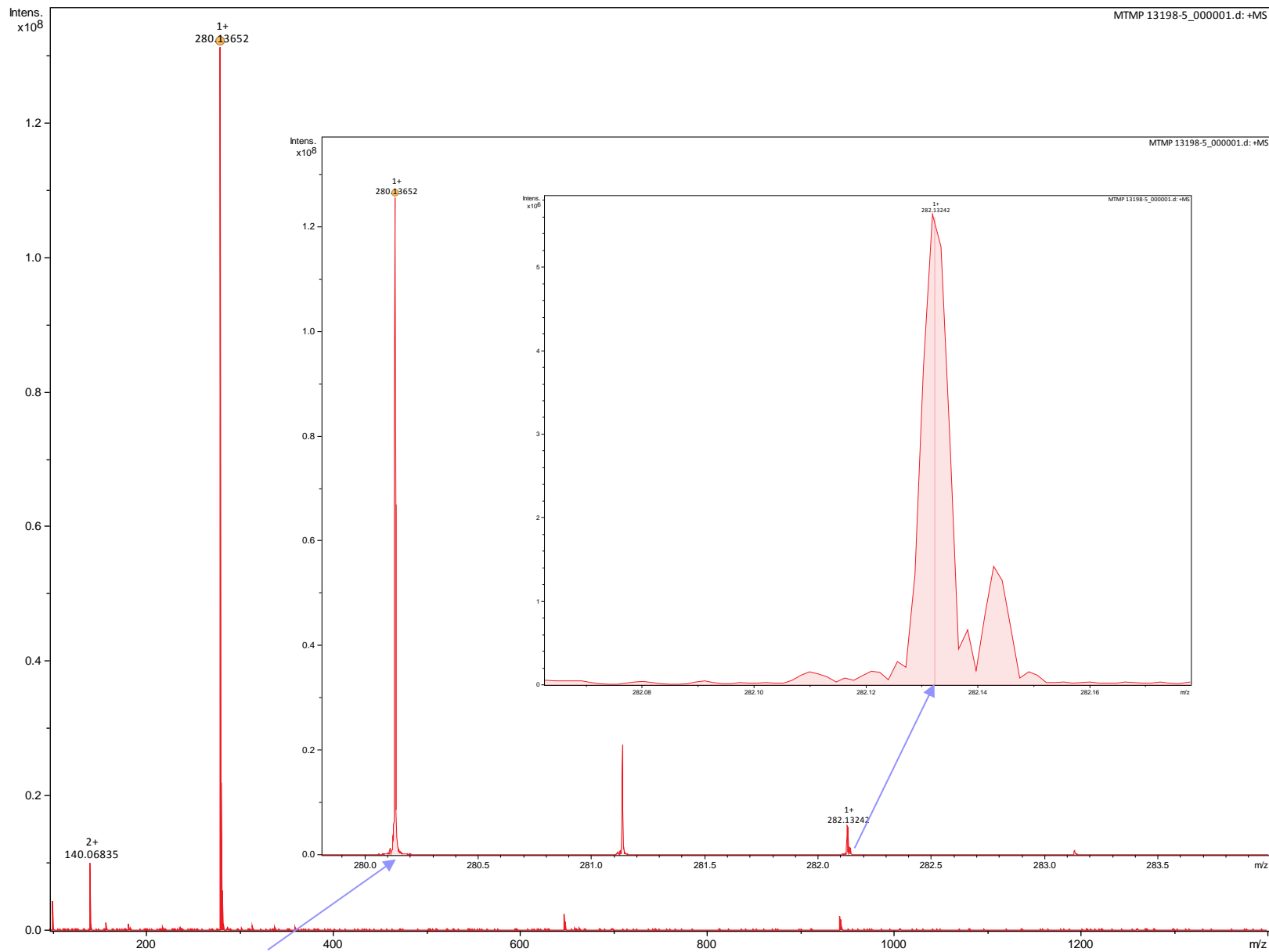


What is it?

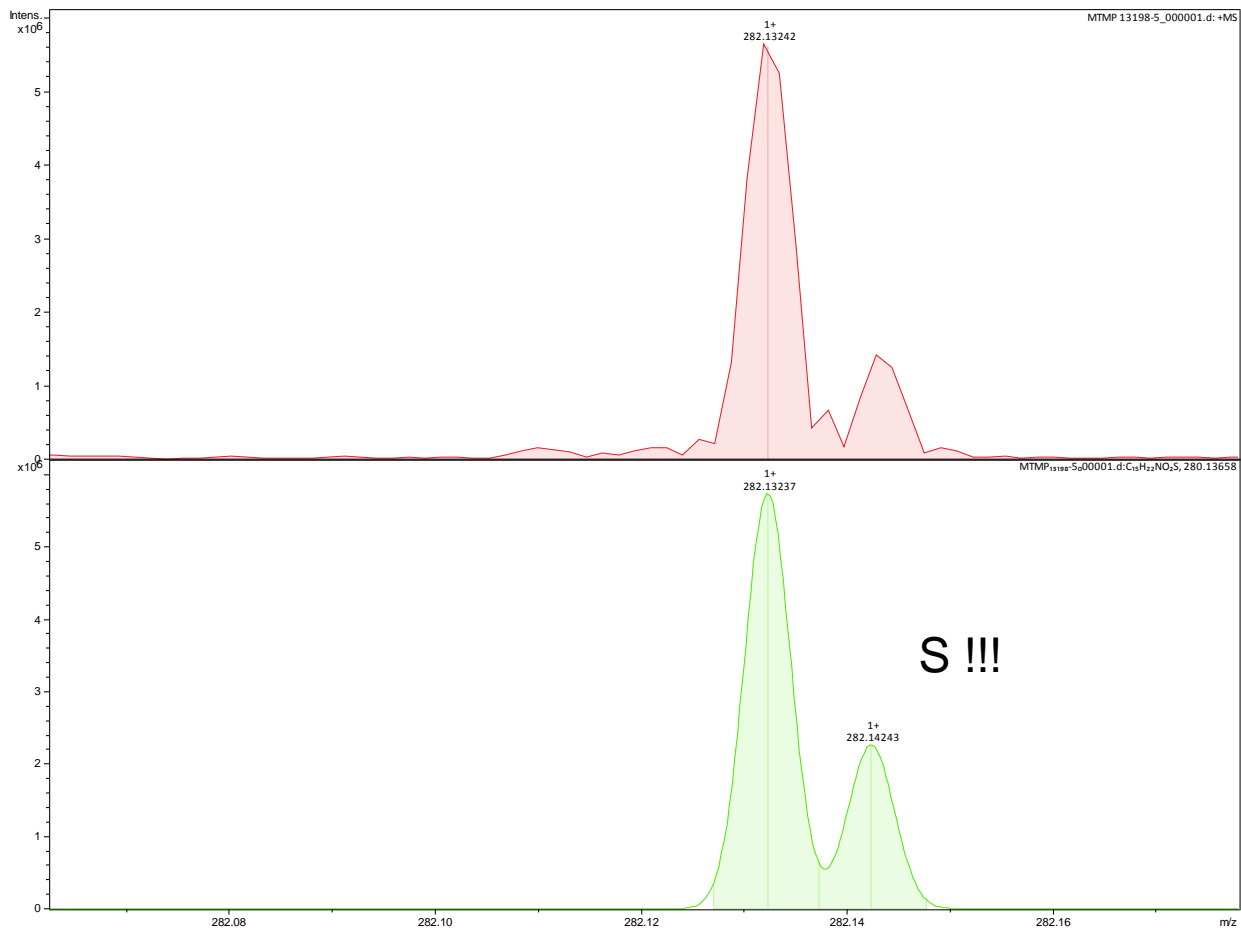


European Monitoring Centre
for Drugs and Drug Addiction





Isotopic pattern detail



FTICR-MS

- Resolução (900.000 @ 7 Tesla)
- Exactidão (<1ppm)
- LC-MS (n...)
- Fragmentação de iões
 - CAD
 - SORI-CAD
 - IRMPD
 - ECD