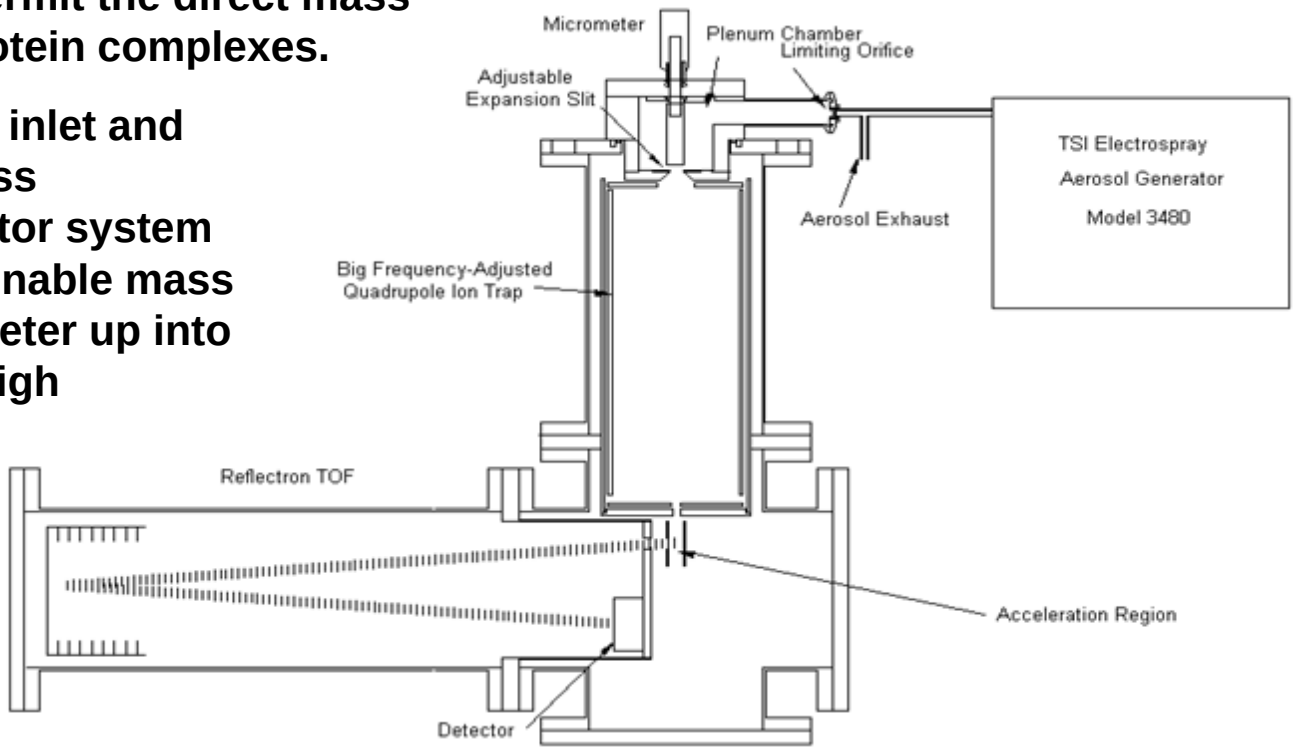
Ultra-High-Mass Mass Spectrometry Beyond 100 kDa

Our goal is to extend the working range of mass spectrometers into the gigadalton (10^9 amu) mass range. We have used a combination of aerodynamics and electrodynamics to create an inlet and trapping system to catch and hold singly-charged particulate ions injected into vacuum from the atmosphere for on-demand delivery into an awaiting mass analyzer. The figure on the right depicts the concept of coupling our inlet and trap with a time-of-flight mass analyzer. Because of our inlet/trapping system, this mass spectrometer will be capable of measuring ions up to 1 megadalton (10^6 amu) with high resolution, mass accuracy and sensitivity. This will permit the direct mass analysis of proteins and protein complexes.

Future work will couple our inlet and trap to a digital ion trap mass spectrometer. A new detector system that will be developed will enable mass analysis with this spectrometer up into the gigadalton range with high resolution and mass accuracy. This instrument will permit the direct analysis of proteins, RNA, DNA and viruses.



Concept schematic for coupling our inlet and trap with an orthogonal reflectron time-of-flight mass spectrometer.