CLAIMS

What is claimed is:

1. A gas analyzer system, the system comprising:

an ionization source configured to create a source electric field in an ionization region of the ionization source, the ionization region receiving a gas from a monitored chamber such that ions of the gas are formed in the ionization source;

a source aperture positioned to emit a portion of the ions of the gas out of the ionization source, the ions being accelerated by the source electric field in a direction towards the source aperture;

a magnet assembly positioned to define a magnetic field to angularly displace the emitted portion of the ions based on a mass to charge ratio of ions of the gas;

a detector positioned to detect a displaced ion component of the emitted portion of the ions;

an ion beam deflector positioned between the source aperture and the detector, the ion beam deflector defining a deflection electric field across the magnetic field and across a direction of travel of the emitted portion of the ions;

and

ion current measurement circuitry electrically connected to measure a current produced from receipt of the displaced ion component at the detector;

the ion beam deflector being configured to direct displaced ion components having different energies and a common ion component mass to be focused through a detector aperture of the detector,

wherein the source aperture is positioned to emit a portion of the ions of the gas out of the ionization source to enter the ion beam deflector closer to one side of the ion beam deflector than a geometrical center of the ion beam deflector.

2. The gas analyzer system of Claim 1, wherein the ionization source comprises a cold cathode ionization source.

3. The gas analyzer system of Claim 1, wherein the ionization source comprises a hot cathode ionization source.

4. The gas analyzer system of Claim 3, wherein the hot cathode ionization source comprises a hot filament and an electron collector configured to create an electron beam through the ionization source between the hot filament and the electron collector.

5. The gas analyzer system of Claim 4, wherein the hot filament and the electron collector are configured to create the electron beam in a direction parallel to the source aperture, the source aperture comprising an aperture elongated in the direction parallel to the electron beam.

6. The gas analyzer system of Claim 1, further comprising an energy filter.

7. The gas analyzer system of Claim 6, wherein the source aperture comprises an elongated aperture, and wherein the energy filter comprises an energy filter grid positioned in an ion beam path of the emitted portion of the ions, the energy filter grid comprising conductive filaments oriented substantially perpendicular to the elongated aperture of the source aperture, and comprising substantially no conductive filaments oriented substantially parallel to the elongated aperture of the source aperture.

8. The gas analyzer system of Claim 6, wherein the energy filter comprises an entry grid positioned between the source aperture and an entry of an ion beam of the emitted portion of the ions into the ion beam deflector.

9. The gas analyzer system of Claim 6, wherein the energy filter comprises an exit grid positioned between an exit of an ion beam of the emitted portion of the ions out of the ion beam deflector, and the detector aperture.

10. The gas analyzer system of Claim 1, wherein the ion beam deflector is configured to align an ion beam of the emitted portion of the ions on the detector.

11. The gas analyzer system of Claim 1, wherein the ion beam deflector comprises a pair of parallel plates.

12. The gas analyzer system of Claim 1, wherein the ion beam deflector comprises a pair of curved plates.

13. The gas analyzer system of Claim 1, further comprising a deflector power supply electrically connected to the ion beam deflector to create the deflection electric field between a pair of deflector plates of the ion beam deflector.

14. The gas analyzer system of Claim 13, wherein the deflector power supply is electrically connected to (i) provide a positive deflector bias voltage to a first deflector plate of the ion beam deflector relative to a ground voltage of a second deflector plate of the ion beam deflector, or (ii) provide a negative deflector bias voltage to the first deflector plate relative to the ground voltage of the second deflector plate, or (iii) provide a first deflector bias voltage to the first deflector plate and a second deflector bias voltage to the second deflector plate.

15. The gas analyzer system of Claim 13, further comprising a deflector control circuit configured to supply a deflector control signal to the deflector power supply.

16. The gas analyzer system of Claim 15, wherein the deflector control circuit is configured to control a voltage of the deflector power supply to cause the ion beam deflector to direct displaced ion components having different energies and a common ion component mass to be focused through a detector aperture of the detector.

17. The gas analyzer system of Claim 15, wherein the deflector control circuit is configured to vary a voltage of the deflector power supply to cause the ion beam deflector to vary a deflection of the displaced ion component of the emitted portion of the ions.

18. The gas analyzer system of Claim 17, wherein the deflector control circuit is configured to vary the voltage of the deflector power supply based on (i) a triangular sawtooth variation of the voltage with time, or (ii) a voltage waveform to control a peak width and temporal position, relative to other ion components, of the displaced ion component.

19. The gas analyzer system of Claim 15, wherein the deflector control circuit is configured to scan a voltage of the deflector power supply to cause the ion beam deflector to deflect plural ion components to be detected by the detector in succession as the voltage of the deflector power supply is scanned.

20. The gas analyzer system of Claim 19, wherein the deflector control circuit is configured to scan the voltage of the deflector power supply to permit detection of a mass spectrum of the plural ion components.

21. The gas analyzer of Claim 1, further comprising total current measurement circuitry electrically connected to measure a total ion current of the ionization source.