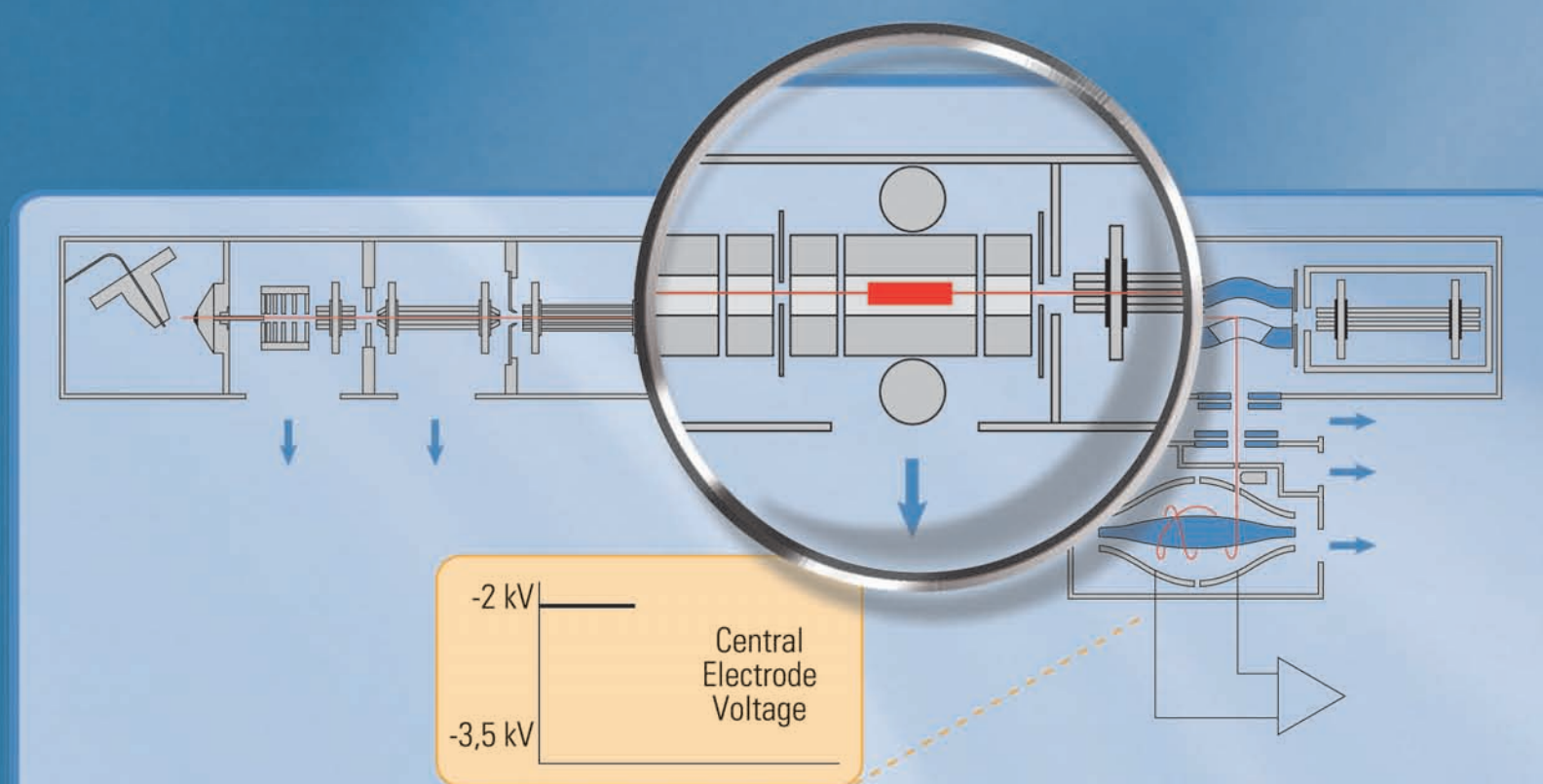
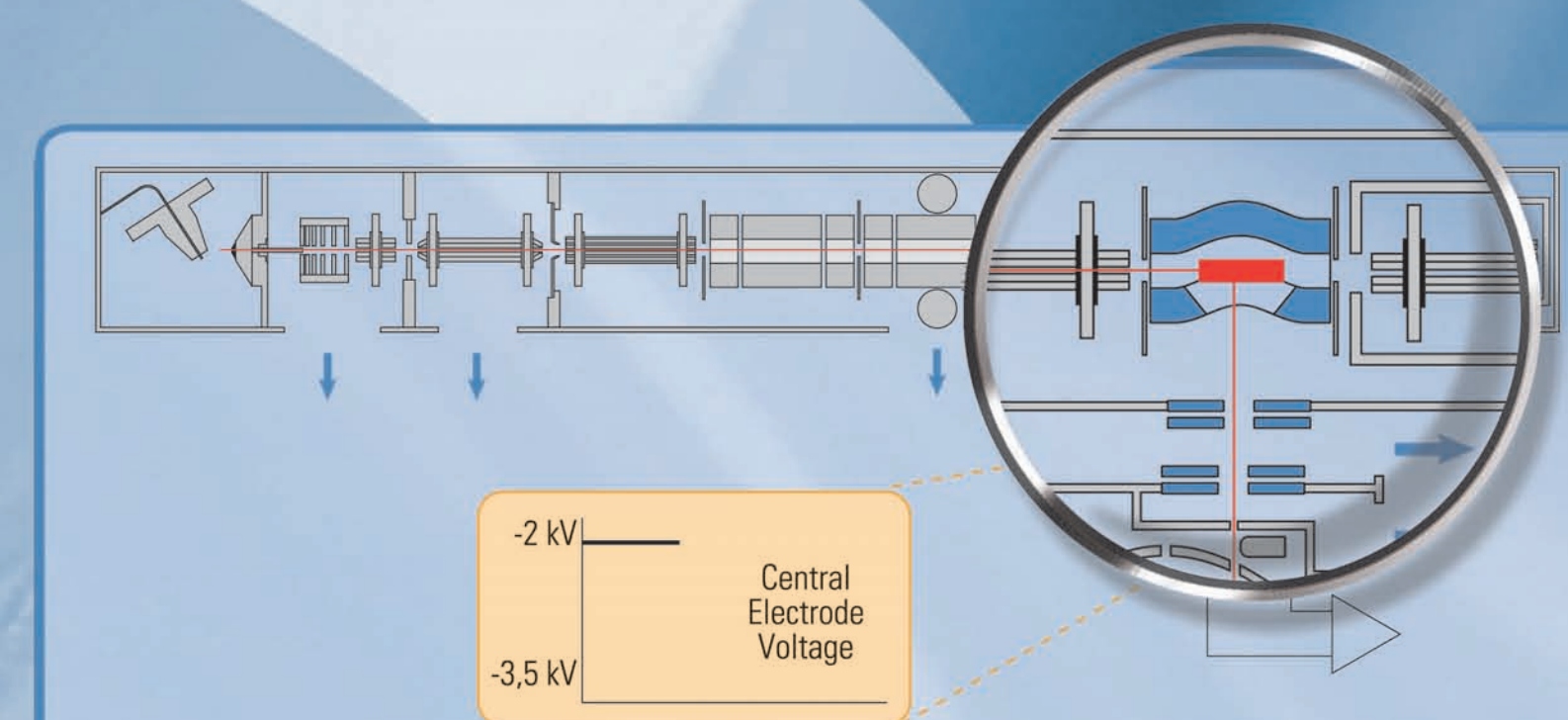


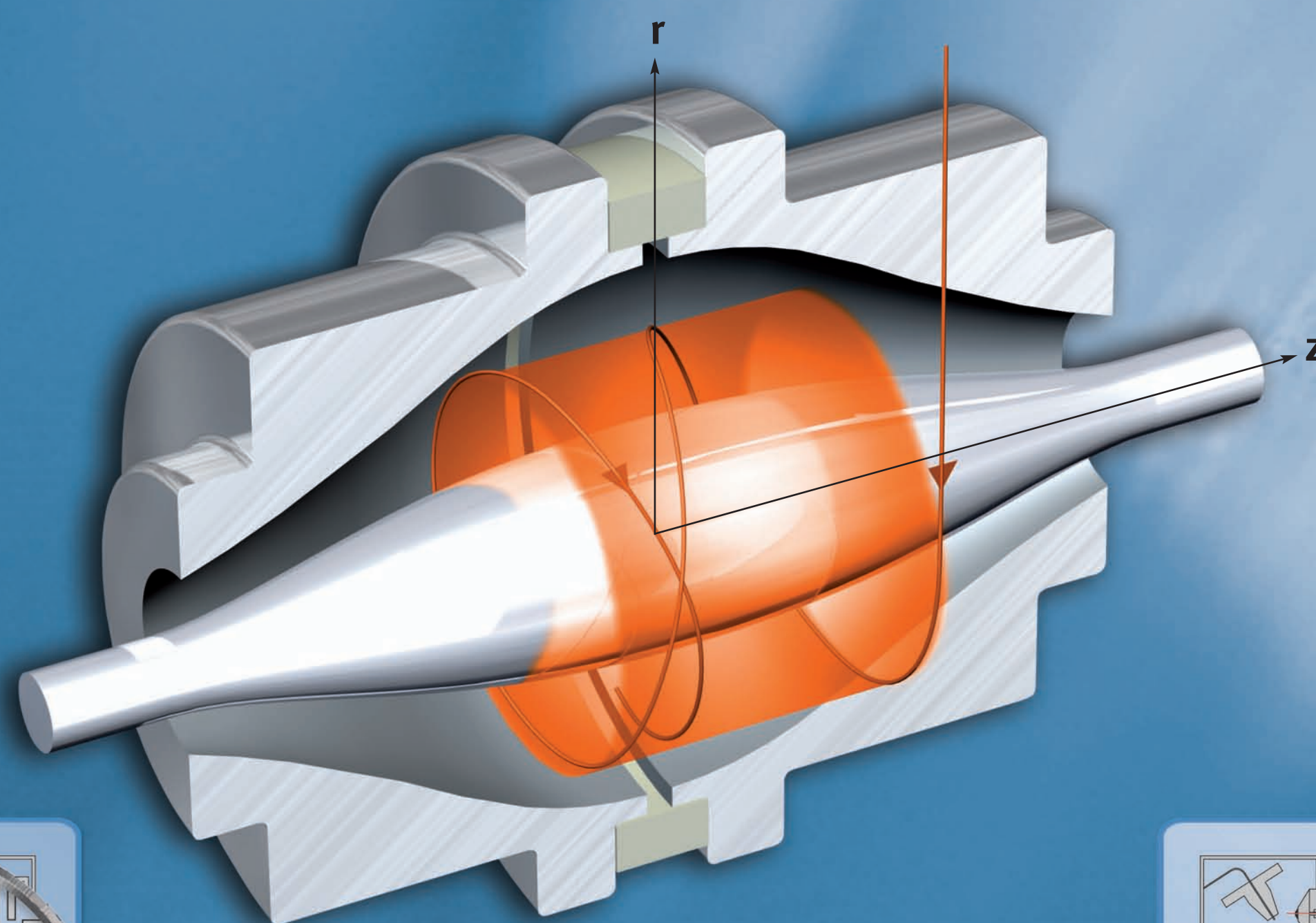
Thermo Scientific Orbitrap Technology – Principle of Operation



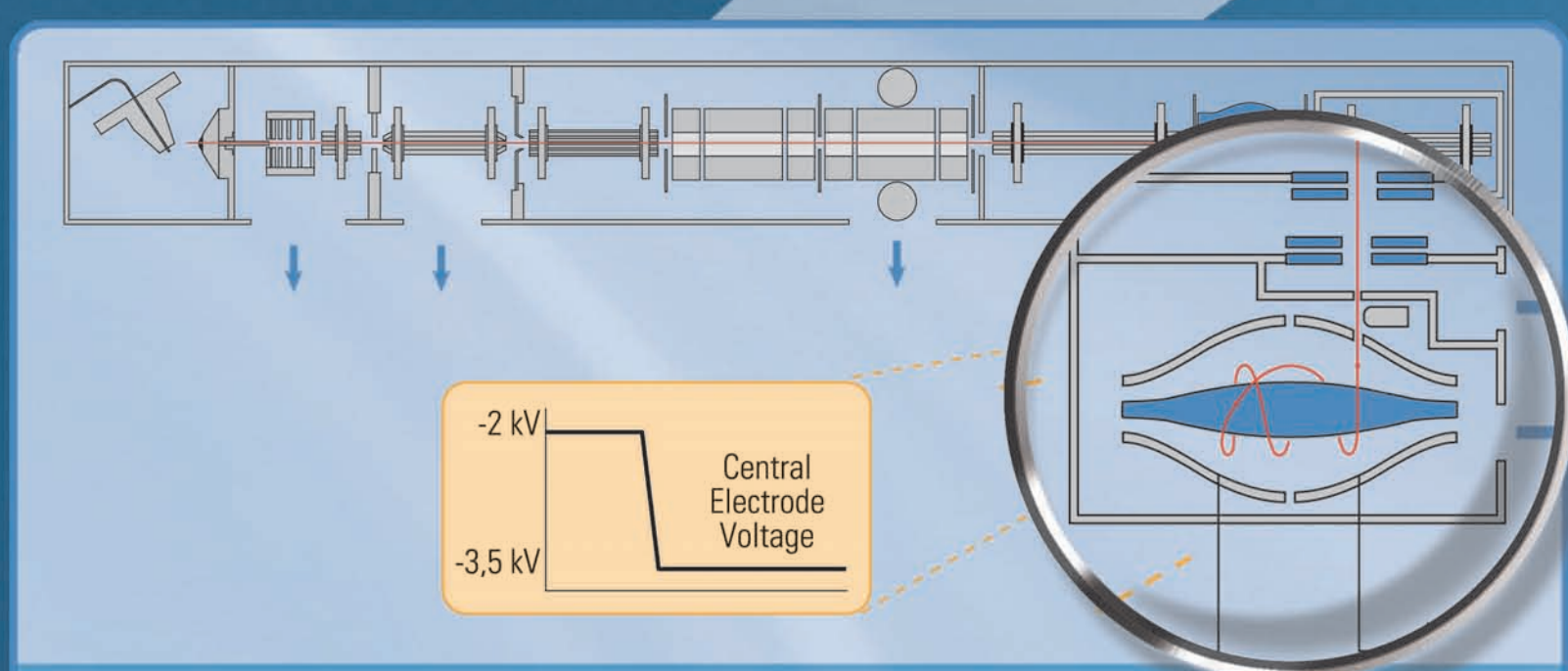
1. Ions are injected from the ion source and trapped in the linear ion trap. Ions of interest can be isolated and fragmented in the linear ion trap, and even scanned out and detected by an independent set of detectors.



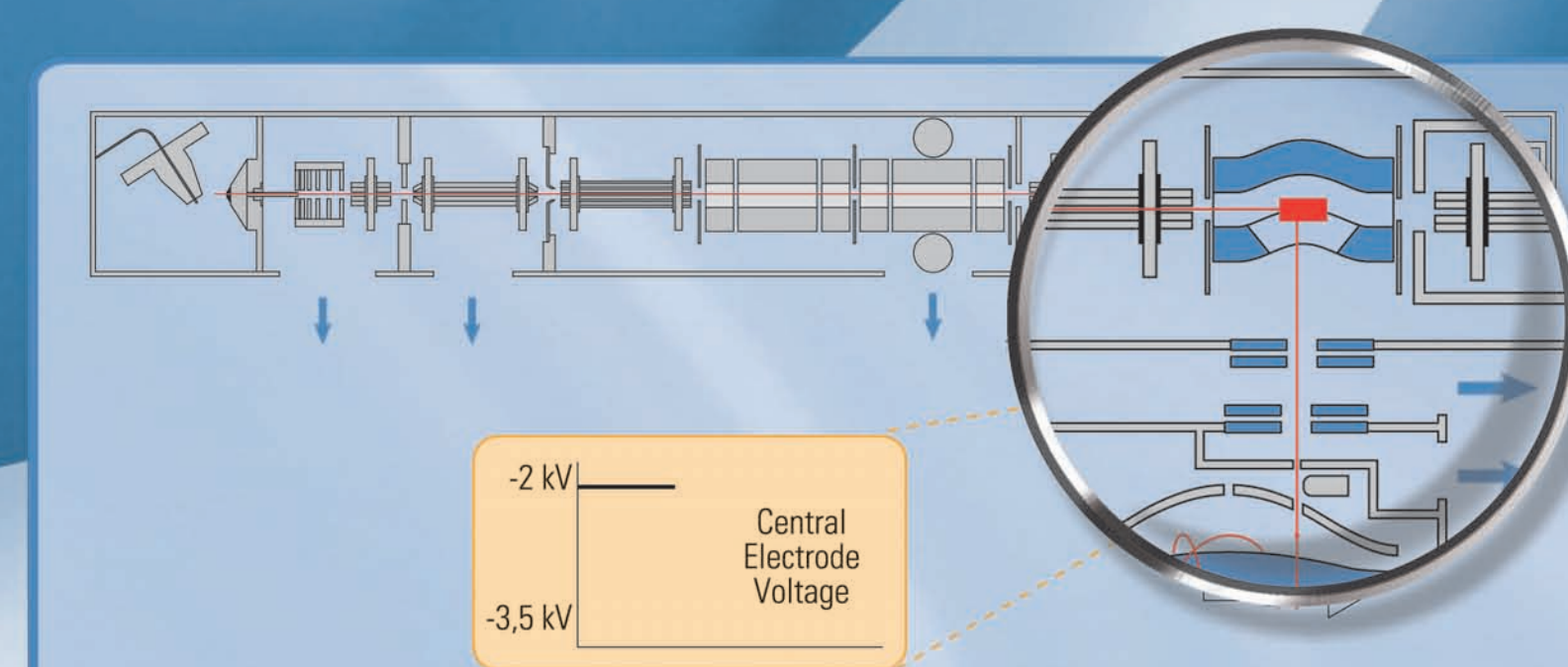
2. To obtain high accuracy measurements, the ions are axially ejected from the linear trap into the C-Trap where they are captured again and 'cooled' by collisions with nitrogen gas.



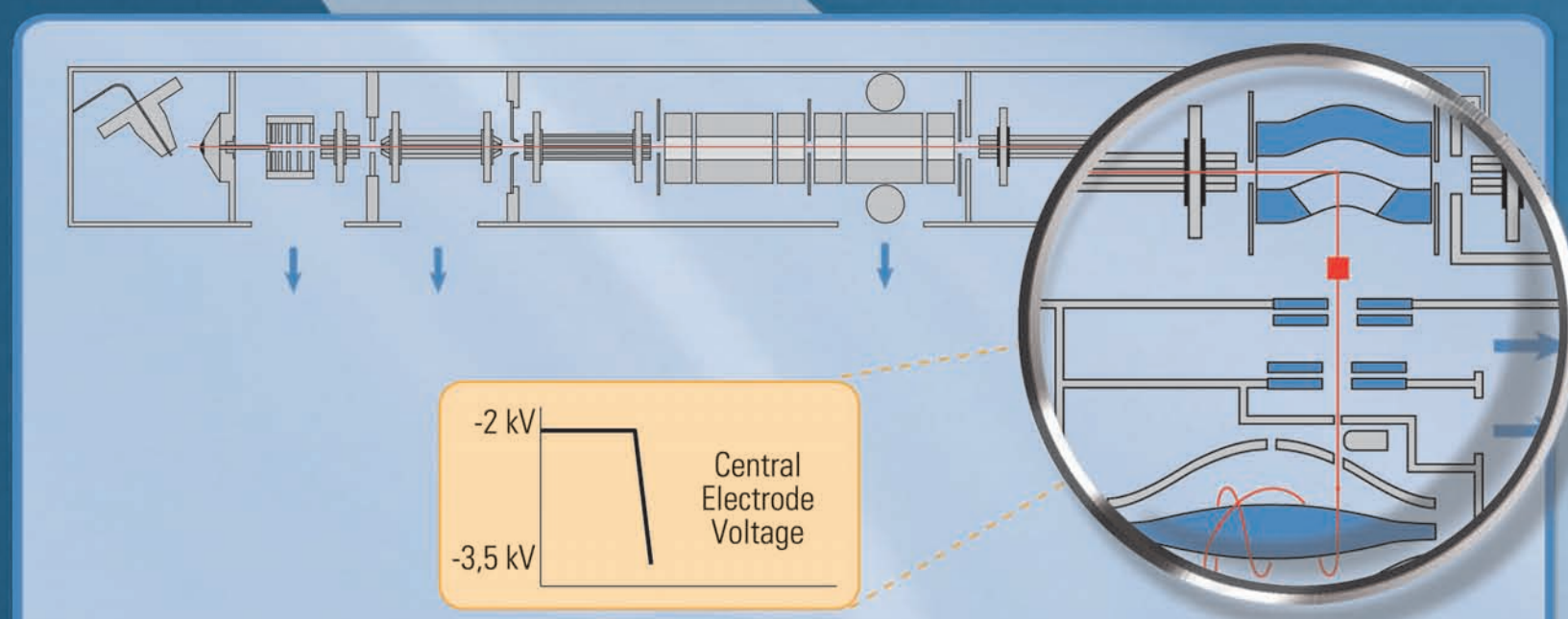
Measured mass is proportional to the frequency of axial oscillations: $\omega_z = \sqrt{\frac{k}{m/q}}$



5. The ions entered the Orbitraps lightly off axis, and keep oscillating along the central electrode (left-right). The image current is recorded on the outer split electrodes. The signals are amplified and transformed into a frequency spectrum by fast Fourier Transformation which is finally converted into a mass spectrum.



3. The ions are squeezed into a smaller cloud within the C-Trap ready for injection into the Orbitrap.



4. As the ions are entering the Orbitrap analyzer, the voltage on the central electrode increases and forces the ion packets into circling around the electrode. The Orbitrap, and voltages on the Orbitrap start to change.