



## **A Novel Atmospheric Pressure Interface Time-of-Flight (APi-TOF) Instrument for Simultaneous Detection of Positive and Negative Ions**

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With common APi-TOF setups two crucial decisions have to be made prior to any experimental investigation: i) the polarity and ii) the  $m/z$  range of the ions of interest. That is, particularly in atmospheric chemistry and environmental research important data will be inevitably lost if the ions do not match these parameters.

Here we present a novel rugged and compact instrument that enables simultaneous detection of positive and negative ions and has a broader detectable  $m/z$  range than established designs. The system consists of an atmospheric pressure interface with a critical orifice for contact free sample introduction, two hexapole ion guides for high ion transmission efficiency over a broad  $m/z$  range and a high performance vacuum pump for high sample throughput. This interface is coupled to an orthogonal TOF analyzer equipped with an ion mirror for increased mass resolution. Two virtually identical versions of this setup with opposite polarity are integrated in one compact instrument so that ions with both polarities can be detected simultaneously.

With proof-of-concept measurements we demonstrate that the hexapole ion guides improve the detectable  $m/z$  range in contrast to common quadrupole designs. Furthermore, the potential of this powerful setup for future applications in atmospheric sciences is exploited.