electrodes in a second segment are maintained at substantially the same second DC potential but adjacent electrodes are supplied with different phases of an AC or RF voltage supply;

electrodes in a third segment are maintained at substantially the same third DC potential but adjacent electrodes are supplied with different phases of an AC or RF voltage supply;

wherein said first, second and third DC potentials are all different and a time of flight mass analyzer down stream of said ion tunnel ion trap, said tie of flight analyzer including a pusher and/or puller electrode for ejecting packets of ion into a substantially field free or drift region wherein ions contained in a packet of ions are temporally separated according to their mass to charge ratio.

24. A mass spectrometer comprising:

an ion tunnel ion trap comprising a plurality of electrodes having apertures through which ions are transmitted in use, wherein the transit time of ions through the ion tunnel ion trap is selected from the group consisting of: (i) ≦0.5 ms; (ii) ≦1.0 ms; (iii) ≦5 ms; (iv) ≦10 ms; (v) ≦20 ms; (vi) 0.01–0.5 ms; (vii) 0.5–1 ms; (viii) 1–5 ms; (ix) 5–10 ms; and (x) 10–20 ms; and

a Time of Flight mass analyser downstream of said ion tunnel ion trap, said Time of Flight analyser including a pusher and/or puller electrode for ejecting packets of ions into a substantially field free or drift region wherein ions contained in a packet of ions are temporally separated according to their mass to charge ratio.

25. A mass spectrometer comprising:

an ion tunnel ion trap, said ion tunnel ion trap comprising a plurality of electrodes having apertures through which ions are transmitted in use, and wherein in a mode of operation trapping DC voltages are supplied to some of said electrodes so that ions are confined in two or more axial DC potential wells, and a time of flight mass analyzer down stream of said ion tunnel ion trap, said tie of flight analyzer including a pusher and/or puller electrode for ejecting packets of ions into a substantially field free or drift region wherein ions contained in a packet of ions are temporally separated according to their mass to charge ratio.

26. A mass spectrometer comprising:

an ion tunnel ion trap comprising a plurality of electrodes having apertures through which ions are transmitted in use, and wherein in a mode of operation a V-shaped, W-shaped, U-shaped, sinusoidal, curved, stepped or linear axial DC potential profile is maintained along at least a portion of said ion tunnel ion trap, and a time of flight mass analyzer down stream of said ion tunnel ion trap, said tie of flight analyzer including a pusher/puller electrode for ejecting packets of ions into a substantially field free or drift region wherein ions contained in a packet of ions are temporally separated according to their mass to charge ratio.

27. A mass spectrometer comprising:

an ion tunnel ion trap comprising a plurality of electrodes having apertures through which ions are transmitted in use, and wherein in a mode of operation an upstream portion of the ion tunnel ion trap continues to receive ions into the ion tunnel ion trap whilst a downstream portion of the ion tunnel ion trap separated from the upstream portion by a potential barrier stores end periodically releases ions, and a time of flight mass analyzer down stream of said ion tunnel ion trap, said tie of flight analyzer including a pusher and/or puller electrode for ejecting packets of ions into a substantially field free or drift region wherein ions contained in a packet of ions are temporally separated according to their mass to charge ratio.

28. A mass spectrometer as claimed in claim **27**, wherein said upstream portion of the ion tunnel ion trap has a length which is at least 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, or 90% of the total length of the ion tunnel ion trap.

29. A mass spectrometer as claimed in claim **27**, wherein said downstream portion of the ion tunnel ion trap has a length which is less than or equal to 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, or 90% of the total length of the ion tunnel ion trap.

30. A mass spectrometer as claimed in claim **27**, wherein the downstream portion of the ion tunnel ion trap is shorter than the upstream portion of the ion tunnel ion trap.

31. A mass spectrometer as claimed in claim **27**, wherein ions are substantially not fragmented within said ion tunnel ion trap.

32. A mass spectrometer comprising:

a continuous ion source for emitting a beam of ions;

an ion trap arranged downstream of said ion source, said ion trap comprising ≧5 electrodes having apertures through which ions are transmitted in use, wherein said electrodes are arranged to radially confine ions within said apertures, and wherein ions are accumulated and periodically released from said ion trap without substantial fragmentation of said ions; and

a Time of Flight mass analyser arranged downstream of said ion trap to receive ions released from said ion trap, said Time of Flight analyser including a pusher and/or puller electrode for ejecting packets of ions into a substantially field free or drift region wherein ions contained in a packet of ions are temporally separated according to their mass to charge ratio.

33. A mass spectrometer as claimed in claim **32**, wherein an axial DC voltage gradient is maintained along at least 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90% or 95% of the length of said ion trap.

34. A mass spectometer as claimed in claim **32**, wherein said continuous ion source comprises an Electrospray or Atmospheric Pressure Chemical Ionisation ion source.

35. A method of mass spectrometry, comprising:

trapping ions in an ion tunnel ion trap comprising a plurality of electrodes having apertures through which ions are transmitted in use; and

releasing ions from said ion trap to a time of flight mass analyser arranged downstream of said ion tunnel ion trap, said Time of Flight analyser including a pusher and/or puller electrode for ejecting packets of ions into a substantially field free or drift region wherein ions contained in a packet of ions are temporally separated according to their mass to charge ratio.

36. A method as claimed in claim **35**, further comprising maintaining an axial DC voltage gradient along at least a portion of the length of the ion trap.

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