1100B: Two-Dimensional Topographic map of effective potential surface
42a: Effective Potential Wells
50a: Longitudinal Barriers
51: Transverse Barrier

FIG. 12

1200A: Three-Dimensional Map of effective potential surface
1200B: Two-Dimensional Topographic map of effective potential surface
42: Effective Potential Wells
50: Longitudinal Barriers

FIG. 13

54: Trapping Areas
56: Steepening of the Effective Potential Barrier
58: New Longitudinal Barrier

FIG. 14

60: Time-lapsed trajectory of charged particle
62: Time-lapsed portion of trajectory during stationary confinement
1400B: Two-Dimensional Topographic map of effective potential surface.

FIG. 15

74: Approaching Ion
76: Induced image current
78: Induced circulation current
80: Induced Inter-electrode circulation current
82: Current load or measuring device.

FIG. 17

1700A: Three-Dimensional Map of effective potential surface
1700B: Two-Dimensional Topographic map of effective potential surface.

FIG. 18

85: Line of Transfer of Effective Potential Well.

FIG. 20

66: Differential Amplifier
68: Low Voltage Sampling Electrical Line
70: High-Voltage RF Sampling Electrical Line
71: Resistive Load
72: Output
73: Switch
84: Analog-To-Digital Device.

FIG. 21

17: Vacuum Housing
19: Electrical module
86: Array controller
88: Digital Signal Processor
90: Logic Unit.

What is claimed is:

1. Charged particle processor apparatus for manipulating charged particles that have an energy and a mass, the apparatus comprising:

- an electrode array (**10**), said electrode array including a of transversely extending, substantially planar electrode sheets (**12**), each of said electrode sheets having at least one perforation therein;
- a plurality of spacer means (**24**), each of said electrode sheets being separated from adjacent electrode sheets by said spacer means, said electrode sheets being aligned relative to one another such that respective perforations of each of said electrode sheets align to form at least one charged particle channel (**26**);
- a vacuum enclosure (**17**) enclosing said plurality of electrode sheets;
- a plurality of electric potential drivers (**14**), each of said drivers being coupled to a respective electrode sheet;
- digital-to-analog converter means (**16**) coupled to said plurality of drivers;
- a data bus (**20**), said data bus being coupled to said digital-to-analog converter means; and
- a computer (**18**) coupled to said digital-to-analog converter means through said data bus, whereby data from said computer is converted by said digital-to-analog converter means to analog data and causes at least one of said drivers to apply an electric potential to at least one of said electrode sheets.

2. An apparatus as claimed in claim **1**, further comprising a charged particle source (**30**) that produces at least one charged particle, said charged particle source being located in relation to said plurality of electrode sheets such that said charged particle produced by said charged particle source can enter one of said charged particle processing channels.

3. An apparatus as claimed in claim **1**, further comprising a charged particle detector (**38,40**), said detector being located in relation to said electrode array such that said charged particle that exits from one of said charged particle processing channels can be detected.

4. An apparatus as claimed in claim **1**, wherein said electric potentials are applied to said electrode sheets by an array of amplifiers (**14**a, **14**b, **14**c).

5. An apparatus as claimed in claim **1**, wherein each of said perforations has a hexagonal shape and has a diameter of approximately $2R_0$, and any two consecutive electrode sheets (**12**) are spaced apart by a distance of approximately $R_0/13$.

6. An apparatus as claimed in claim **1**, wherein said electrode sheets (**12**) are numbered consecutively $j=1,2, \ldots, J(J\geqq 2)$ and said electric potential applied to said electrode sheet number j has the form $P(j,t)=\phi_0\,\mathrm{Sign}[A(j,t)]\,|A(j,t)|^{s(j,t)}\,\sin(\omega t)$, where $A(j,t)=\cos[2\pi f(j,t)\,w(j,t)-k(j,t)]$, where t is a time variable, ω is a selected angular frequency, ϕ_0 is a selected electric potential amplitude, and f(j,t), s(j,t), w(j,t) and k(j,t) are time-dependent functions selected for said electrode sheet number j.

7. An apparatus as claimed in claim **6**, wherein said functions f(j,t), s(j,t), w(j,t) and k(j,t) for at least one of said integers j are chosen so that said charged particles lose net energy when said charged particles are adjacent to said electrode sheet number j.

8. An apparatus as claimed in claim **1**, wherein at least one of said electrode sheets is electrically connected to a source of ground potential through a path that has a selected electrical resistance (**77**).

9. An apparatus as claimed in claim **1**, wherein at least two adjacent electrode sheets are electrically connected to each other through a path that has a selected electrical resistance (**82**).

10. An apparatus as claimed in claim **1**, further comprising a low pressure gas of neutral particles that surround said electrode sheets (**12**) and undergo collisions with said charged particles, thereby reducing kinetic energy of said charged particles.