WHAT IS CLAIMED IS:

1. A negative ion-based beam injector comprises

an ion source configured to produce a negative ion beam, and

an accelerator spaced apart from and indirectly coupled to the ion source.

2. A negative ion-based beam injector comprises

an ion source configured to produce a negative ion beam,

an accelerator spaced apart from the ion source, and

a transition zone interposing the ion source and the accelerator, the transition zone comprises a low energy beam transport line, wherein low energy beam transport line includes cesium traps.

3. A negative ion-based beam injector comprises

an ion source configured to produce a negative ion beam,

an accelerator spaced apart from the ion source, and

a transition zone interposing the ion source and the accelerator, the transition zone comprises a low energy beam transport line, wherein the low energy beam transport line includes bending magnets that deflect orthogonally to its direction of motion and focus the beam onto the axis of the accelerator.

4. A negative ion-based beam injector comprises

an ion source configured to produce a negative ion beam, the ion source including a pre-accelerator having an electrostatic grid,

an accelerator spaced apart from the pre-accelerator, and

a distributing manifold for directly supplying cesium on the electrostatic grid of the pre-accelerator.

5. A negative ion-based beam injector comprises

an ion source configured to produce a negative ion beam, the ion source including a pre-accelerator having external magnets to deflect co-extracted electrons in an ion extraction and pre-acceleration region, and

an accelerator spaced apart from the pre-accelerator.

6. A negative ion-based beam injector comprises

an ion source configured to produce a negative ion beam, wherein the ion source includes a plasma container and plasma drivers, wherein the internal walls of the plasma container are configured to maintain elevated temperatures of 150-200° C, and

an accelerator spaced apart from the ion source.

7. The injector of claims 1 and 4 through 6, further comprising a transition zone interposing the ion source and the accelerator.

8. The injector of claims 7, 12, 14 and 15, wherein the transition zone comprises a low energy beam transport line

9. The injector of claim 8, wherein the low energy beam transport line includes cesium traps.

10. The injector of claim 8, wherein the low energy beam transport line includes bending magnets that deflect orthogonally to its direction of motion and focus the beam onto the axis of the accelerator.

11. The injector of claims 1 through 5, wherein the ion source includes a plasma container and plasma drivers.

12. The injector of claim 7, wherein the ion source includes a plasma container and plasma drivers.

13. The injector of claim 11, wherein internal walls of the plasma container are configured to maintain elevated temperatures of 150-200° C.

14. The injector of claim 12, wherein internal walls of the plasma container are configured to maintain elevated temperatures of 150-200° C.

15. The injector of claims 1 through 3, 6, and 12 through 14, wherein the ion source includes a pre-accelerator.

16. The injector of claim 15, wherein the pre-accelerator comprises an electrostatic grid having a plurality of electrodes, wherein each of the plurality of electrodes having a plurality of apertures.

17. The injector of claim 16, further comprising a distributing manifold for directly supplying cesium on the electrostatic grid of the pre-accelerator.

18. The injector of claim 15, wherein the pre-accelerator includes external magnets to deflect co-extracted electrons in an ion extraction and pre-acceleration region.

19. The injector of claims 16 and 17, wherein the pre-accelerator includes external magnets to deflect co-extracted electrons in an ion extraction and pre-acceleration region.

20. The injector of claim 15, further comprising a pumping system to pump gas out from a pre-acceleration gap.

21. The injector of claims 16 through 18, further comprising a pumping system to pump gas out from a pre-acceleration gap.

22. The injector of claims 16 and 17, wherein at least one of the plurality of electrodes is positively biased to pre-accelerate negative ions in the negative ion beam.

23. The injector of claims 16 and 17, wherein the plurality of apertures are configured for focusing and passing negative ions to form the negative ion beam.

24. The injector of claims 1 through 6, 9 and 10, 12 through 14, 16 through 18 and 20, further comprising a neutralizer interconnected to the accelerator.