Multi-Beam Type LINAC for HIF Injector

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The very high intense heavy-ion beam is a high attraction for heavy ion researches and heavy-ion applications, but it is limited by heavy-ion production of existing ion source and space-charge-effect in acceleration. There is one way, accelerating several heavy-ion beams in one cavity at same time and funneling them, which could achieve the acceleration of very high intense heavy-ion beam with existing ion source and accelerating technology.

1. The study of Multi-beam type cavity started in 1990s, and the first multi-beam type cavity, a 2-beam type RFQ which was designed and fabricated by Tokyo Institute of technology, accelerated 108mA C2+ beams (54mA / channel) from 5 keV/u up to 60 keV/u [1]. This is a real breakthrough for accelerating high intensity heavy ion beam. And a prototype 4-beam RFQ was calculated and simulated for the HIF driver. In our proposed multi-beam-type-linac-based HIF injector, there are four laser ion sources which will be connected to a 4-beam RFQ type injector, and a funneling system will be used to funnel the accelerated the four beams to two beams at the outside of the RFQ, then, the two beams will be injected to a 2-beam type drift tube linacs (DTL), after that, the two beams from DTL will be funneled to one beam, and finally, the funneled one beam will be delivered to the post-facilities by using the superconducting type linacs. The image of the multi-beam-cavity-based HIF injector is shown in figure 1.

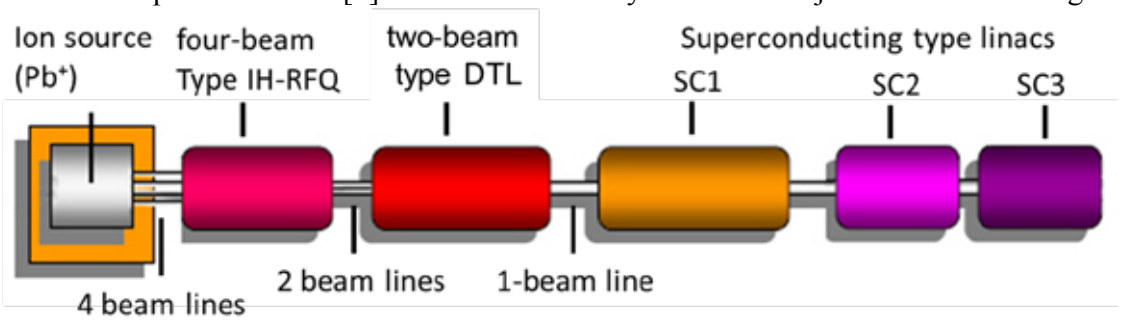

Figure 1. The image of the multi-beam-cavity-based HIF driver.

References

[1] Liang Lu, *et al.,* Nucl. Instr. And Meth.Phys. Res. A 729 (2013) 133-137