A Quantum Beam Driver for the Future Inertial Fusion

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Several heavy ion drivers for the inertial fusion have been proposed in Europe and US based on the existing the RF technology and the linear induction linac technology, though their concepts don't still achieve the reality in a gigantic large scale. Developing accelerator technology may allow a compact and relatively cheap quantum beam driver for the future inertial fusion as an alternative scheme. Through the last decade the induction synchrotron has been developed [1, 2], which can take away a limitation of RF frequency band-width inherent for all RF accelerators and remarkably increase a freedom of beam handling by the functional separation of beam acceleration and confinement in the moving direction. Especially the feasibility study of induction microtrons [2], in which heavy ions such as Pb2+ or C-6010+ with a large mass to charge ratio can be accelerated from their extremely low energy, tells us that it may be available as a kind of injector for the downstream main driver. At the conference, a novel driver system will be proposed, which consists of a multiple and two-way induction synchrotron, a permanent magnet stacking ring, and induction microtrons as an injector. The paper is accompanied with related papers describing the cluster ion source and the high power 3.3 kV SiC-MOSFET switching device that are crucial to realize the novel quantum beam driver of concern.

KEK 12GeV PS and Tevatron of Fermilab have been already shutdown. Other high energy accelerators being operated in the world will cease their roles until 2030. SuperKEKB, RHIC of BNL, and HERA of DESY may be among them. Their infrastructures such as accelerator tunnels with the perfect radiation shield capability are quite valuable. Their recycle uses for the future fundament energy science should be supported by tax payers, though there may be some friction with the existing stakeholders. The authors wish to create a kind of international consortium to consider our present task with the same vector.

References

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