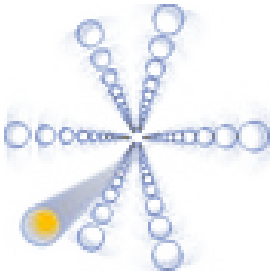

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Proposal of A Compact Coherent X-ray Source for The Medical Imaging Use Based on An Energy-Recovery Linac and Parametric X-ray Radiation

Monday, 6 October 2014 18:00 (15 minutes)

The development of compact x-ray generator based on the electron cryo-linear accelerator has been studied in collaboration with Nihon university, High energy accelerator research organization and Toyama. To realize highly sensitive phase contrast imaging at clinics, a parametric x-ray radiation (PXR)-based source is one of attractive candidates[1-3]. However, the monochromatic x-rays of 109 to 1010 flux are required for practical medical use. Since recent studies on PXR have shown that the available x-ray flux is increased by using an asymmetric cut crystal as a PXR radiator, it is supposed that the necessary x-ray flux should be sufficiently achieved using a 75 MeV high duty electron linac with average current of 20-30 uA. With respect to the electric power consumption, it is not so difficult to develop the linac of such performance. A significant problem for medical use is the dimension of the building in which the x-ray generator is installed, which is dominated by the size of liniac and the volume of the radiation shield. Therefore, a normal-conducting compact energy recovery liniac (ERL) for a PXR source has been planned in the design study to reduce the dimension of the machine and the surrounding radiation shield. Study on the element technologies is under way, including development of high Q-value accelerating cavities made of high purity copper materials. For the present, the specifications normal conducting ERL was determined on the basis of the results of the simulation study.

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