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High brightness photoinjector driven high-resolution high-energy X-ray CT

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High-resolution high-energy X-ray computed tomography is one of the most effective methods for inspection of high-density samples with fine structures. Theoretically, minimizing the effective focal spot size of the X-ray source can significantly improve spatial resolution of X-ray CT. In the paper, we report our progress on high-resolution high-energy X-ray CT driven by a bright photoinjector, which can generate high quality electron beams with low emittance and low energy spread. Using strong focusing magnets, 9 MeV high-brightness electron beams are focused down to a few tens of microns and then impact on a specially designed tungsten target to form a micro-focus X-ray source. Experimental outcomes show that an ultra-high resolution of 10 Lp/mm has been readily obtained, thus verifying the effectiveness and potential of bright photoinjector driven high-resolution high-energy X-ray CT.

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