

High resolution phase contrast images of biological specimens obtained from a 20TW laser

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Betatron radiation emitted from relativistic electrons in the laser wakefield accelerators(LWFA) with high brightness and micron size can be applied to phase contrast imaging [1][2]. But one of the main limitations of the betatron x-ray source is the significant shot-to-shot fluctuations. A bright and stable x-ray source with 1.1×10^7 photons(>4keV) per shot based on a 20TW laser has been developed. We found a way to decrease the shot-to-shot fluctuations by multiple shots accumulation and quantified the shot number required to ensure the stability, while high quality phase contrast images with a contrast higher than 0.61 and a resolution better than $10\mu\text{m}$ of biological specimens with skins, bones and organs were obtained.

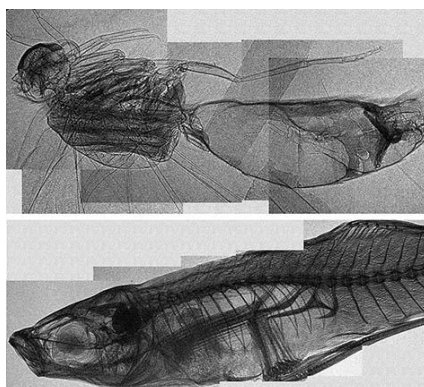


Figure 1. Phase contrast images of an about 1cm of butterfly and fish. Many details of head, skins, organs can be clearly seen.

References

[1] S. Kneip *et al.* Appl. Phys. Lett. 99, 093701 (2011).

[2] J. Wenz *et al.* Nat. Commun. 6,7568 (2015).