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Origin of the Complex Beam Profile of a Hole-Coupled Free Electron Laser Oscillator

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Infrared FEL oscillators generally use hole-coupling to extract intracavity laser power. The hole-coupling inherently causes a non-Gaussian beam profile at user stations, which are more than 10 m apart from the coupling hole. It is due to the existence of the Airy pattern in the extracted laser beam. We demonstrated that the beam profile can be changed from a non-Gaussian to a nearly Gaussian distribution by removing the Airy pattern in the experiments and physical optics calculations [1]. This work was supported by MEXT Q-LEAP (JPMXS0118070271).

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