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Coherent combination of unequal photonic crystal fibre lasers

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There is increasing demand for high average, high peak power laser systems to drive laser wakefield plasma accelerators (LWFAs) at > kHz repetition rates. One promising route to these systems is the coherent combination of lower power laser systems and much attention has focused on fibre lasers as suitable candidates, in both filled and tiled aperture configurations. However, previous work has concentrated on the combination of exactly identical fibres. To achieve the pulse energies required for LWFA, many hundreds if not thousands of fibres would need to be combined together, which cannot all be entirely identical. In this work, we present research on the coherent combination of two photonic crystal fibre laser amplifiers with very different properties, reporting higher combined powers and combination efficiency than previously shown.

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