

# Low differential phase noise ytterbium-doped fiber amplifier system for coherent beam combination

William Kerridge-Johns, Changshun Hou, Weilong Yu, Johan Nilsson

*Optoelectronics Research Centre  
University of Southampton  
SO15 1BJ  
UK  
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Coherent beam combination (CBC) is a leading approach for the power-scaling of laser sources, where a tiled array of sources allows control of the beam shape, in addition to power combination. CBC requires phase locking of each laser element. Ultimately active phase control is needed, but reducing the differential phase noise of the sources allows for more diverse active control schemes. In this work, we construct a two-channel ytterbium-doped fiber amplifier system. Phase noise frequency components above 30 Hz did not need active control to meet the requirements of high-efficiency beam combination at 200 W channel power. The phases were then actively stabilised, which resulted in a differential RMS phase noise of 40 mrad ( $\lambda/160$ ). We aim to implement these sources in a tiled array CBC system, where the demonstrated performance will simplify and enhance advanced beam-shaping capabilities.