

The Future is Fiber Accelerators

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The challenge of producing the next generation of particle accelerators for scientific and societal applications, has been taken up by the High-intensity Community.

One of the main standing issues for creating laser-based accelerators to match or better the performance of traditional accelerators is the requirement that the drive lasers produce simultaneously high peak and high average power with high efficiency >30%. . Even state of the art petawatt lasers typically have average powers of only a few tens of watts with a wall plug efficiency of 10-4. These are pitiful considering that real accelerators will require pulse repetition rates much higher –tens of kHz –and average laser powers of hundreds of kW with wall plug efficiency >30%.

The international Coherent Amplification Network (ICAN) has shown[1] that a novel laser architecture based on a massive array of fibre lasers could be a cost effective solution. In addition to high peak and average powers, excellent efficiency it offers the potential of perfect and digitally controllable beam quality.

[1] Gerard Mourou, Bill Brocklesby, Toshiki Tajima, and Jens Limpert, The future is Fiber Accelerators, Nature Photonics, Vol.7, 258-261 (213)

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