

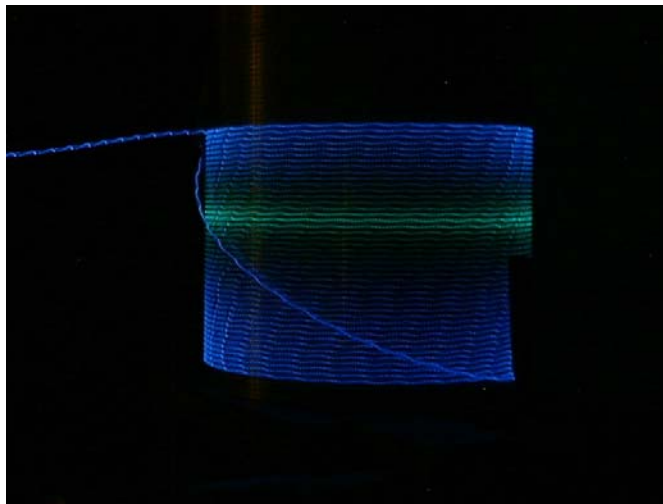
High Power Fiber Lasers

Andy Clarkson

*Optoelectronics Research Centre
University of Southampton,
Southampton, UK*

Course description:

Recent advances in cladding-pumped fiber lasers and amplifiers have been dramatic, leading to unprecedented levels of performance in terms of output power, efficiency, beam quality and wavelength coverage. These achievements have attracted growing interest within the community and have fueled thoughts that fiber-based sources may one day replace conventional “bulk” solid-state lasers in many application areas. The main attractions of cladding-pumped fiber sources are derived directly from their geometry, which simultaneously allows very efficient generation of coherent light and almost complete immunity from the effects of heat generation, which are so detrimental to the performance of other types of lasers.



This course aims to provide an introduction to high power fiber lasers and amplifiers, starting from the basic principles of operation and ending with examples of current state-of-the-art devices and some thoughts on future prospects. The course will cover a range of topics, including basic fiber laser and amplifier theory, spectroscopy of the relevant rare earth ions for high power devices, a discussion of the factors influencing laser and amplifier performance, fiber design and fabrication, pump sources and pump launching schemes, fiber resonator design, master-oscillator and power-amplifier configurations, linewidth control and wavelength selection, transverse mode selection, nonlinear loss processes (SBS and SRS) and their impact on performance, and heat generation and its impact on power scalability. The course will also give an overview of techniques (e.g. coherent and spectral beam combining) for further scaling of output power and provide an introduction to hybrid fiber-bulk laser schemes for scaling pulse energy.