

High average power, high rep rate lasers: Technological challenges towards multi-disciplinary applications

Lasers with high peak powers and high-energy have long been used for discovery science as well as technology demonstrations, ranging from recreating astrophysical conditions in the laboratory to driving plasma-based accelerators and inertial confinement fusion. With the novel schemes that enable high power lasers operating at high repetition rates with kW average power, we are now entering a new era of applications of these lasers in industry, medicine, security, and defence sectors. Any sustainable high-average power laser technology should include schemes to manage the heat load in the system, ensuring maximum gain and conversion efficiencies, whilst maintaining a good beam quality. I will discuss the Diode-Pumped Solid State Laser (DPSSL) developments in CLF, enabling high-average power laser drivers for future plasma accelerators, including EPAC and potentially EuPRAXIA.

Primary author: COLLIER, John (CLF, STFC, UKRI)

Presenter: PATTATHIL, Rajeev (Rutherford Appleton Laboratory)

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