

Foreword

John Collier Director, Central Laser Facility, STFC Rutherford Appleton Laboratory, Harwell Campus, Didcot, UK | Email address: john.collier@stfc.ac.uk | Website: www.clf.stfc.ac.uk



"No photon left behind!" was the rather poetic way that the Chair of the Central Laser Facility's Facility Board summarised our performance and forward strategy after the

last meeting. This external Board oversees what we do, and the Chair was reflecting on the breadth, depth, and volume of the work that we are doing. Her opinion backed that of the earlier CLF Review – a tour de force of everything CLF, past, present, and future – which gave a rousing endorsement of what we are, what we are doing, and what we want to do. Certainly, when the scale of our endeavour is presented in a single forum, it is clearly impressive and something of which we can be really proud.

Our science programme has continued unabated, delivering some world-class, high-profile results and publications. However, we are not resting on our laurels and have developed an ambitious strategy for the next decade that sets out, in black and white, where we want the CLF to go and what we want to achieve.

The Extreme Photonics Applications Centre (EPAC) forges ahead. At the same time, we have plans to upgrade our Vulcan, Ultra and Artemis facilities, which we hope to begin in

the coming year, enabling new and improved user applications and helping to secure the international leadership of the UK in several areas of science into the next decade. Beyond large facility investments, we have applied for funding for several new initiatives. We are planning a ground-breaking facility, based around a new form of Raman spectroscopy with application in cultural heritage, drawing in the Arts and Humanities Research Council as a sponsor for the first time. In a more familiar area, we have submitted a proposal for a joint CLF and Technology project to develop a new laser design for laser fusion, with the government Department of Net Zero and Energy Security as the sponsor. If these bids are successful, the CLF will have three government departments funding our work, which is a tremendously powerful statement.

In the environmental sciences, we are reaching out to the Environment Agency and are planning new European Union opportunities now that the UK has joined Horizon Europe, the EU's key funding programme for research and innovation. We have launched a new international programme with our colleagues in India in bio-imaging and AI applied to cancer research, expanding the scope of the highly successful EPIC project. CALTA is building the DiPOLE100-S laser system, the latest addition

to its DiPOLE series, for installation in the ELI Beamlines Facility in Prague.

This system runs at 100 Hz, another world first! One of its predecessors, the DiPOLE100-X system, has been commissioned on an instrument at the European XFEL in Hamburg, and the very first experiment is scheduled to take place very shortly. As the repetition rate of high-power lasers rises, the demand for large numbers of targets is also rising. Scitech Precision, our target fabrication spinout, is able to deliver the highest quality targets fulfilling the most complex of experimental demands, and not surprisingly has had its best year ever.

There are so many things I could write about this year and our accomplishments, but *"No photon left behind!"* sums it up perfectly!

This annual report offers you an insight into some of the scientific and technical research that has been carried out by users of the CLF and its staff over the financial year 2022/23. The research spans a broad range of science areas, and supports wide-reaching efforts to solve major scientific, economic, and societal challenges. I do hope that you enjoy reading this selection of abstracts, and feel inspired by the achievements of all those involved. I think we can be really proud of what we are doing, the impact it is having, and the difference we are making.



Professor John Collier FLSW
Director, Central Laser Facility