This document contains the titles and abstracts of all the invited speakers for the Photonics3B stream (Lasers).

1. **Dr HB Shrivastava (Lastec, DRDO)**

Title: Recent development in high power fiber lasers

Abstract

High efficiency, low thermal management problems, small footprint and above all high beam quality at high powers, make fiber lasers the most suitable choice for important applications in both civil and defence sectors. The talk would present recent achievements and challenges in the development of kilowatt-class CW and high peak power pulsed fiber lasers at LASTEC.

2. **Dr PK Mukhopadhyay (RRCAT, DAE)** {Please note the change of speaker from RRCAT to from BN Upadhyay to PK Mukhopadhyay)

Title: Generation and amplification of optical pulses in diverse temporal formats from mode-locked Yb-doped fiber laser

Short abstract: Modelocked fiber laser provides an ideal platform for generation of optical pulses in diverse temporal formats due to strong interplay of dispersion, self-phase modulation, spectral filtering, linear and nonlinear gain and losses. In this talk I shall present our recent work on generation and amplification of pulses from modelocked Yb-doped fiber laser in diverse temporal format including dispersion managed soliton, dissipative soliton, dissipative soliton resonance, chair-like pulses, step like pulses, bound pulses, burst of pulses and soliton rain. The physical basis of building such modelocked lasers and amplification characteristics of some of the pulse profiles will be discussed.

3. **Dr Mrinmoy Pal (CSIR-CGCRI)**

Title: Fiber Laser Activity at CSIR-CGCRI

Abstract:

High-power fiber lasers have seen astonishingly rapid progress over the last decade in a wide range of configurations, spectral ranges, and temporal formats, and are now leading contenders for many important applications like material processing (marking, engraving, scribing, welding, cutting etc), additive manufacturing, automobile, consumer electronics, medical and other sectors requiring power levels from a few watts up to many kilowatts. Though the fiber laser technology becoming one of the cutting-edge technologies, some criticalities are still there in high power level, namely modulation instability (MI), photodarkening (PD) effect, non-linearity and thermal management. All these issues will be discussed in the talk. The indigenously developed fiber laser technology will fulfill the

requirement of desired specifications of the end-users. I will present our current as well as futuristic activities on fabrication of the specialty laser fiber and fiber based components for prototype laser modules development.

4. **Dr Jagannath Nayak (CHESS, DRDO)**

Title: Control System for Fine Pointing of High Energy Laser

The ability to accurately point a laser beam is becoming increasingly important [1]. The performance capability of a control system depend on how tightly light focus at target It has many applications, such as LIDAR, countermeasures, remote sensing, target illumination, micromachining and directed energy weapons.
The control system is composed of several assemblies to carry out multiple functions where software is also an essential component of the integrated system. The target engagement starts with a cueing sensor indicate the target location, and then the beam control switches to engagement mode, in which the operator lock the target with electro-optic tracking system (EOTS) integrated on the laser platform. Once the target is locked the EOTS will track the target and centered camera of EOTS. Then target is illuminated to carry out fine pointing with micro-radian accuracy through active imaging. Laser beam focusing at the target can be assisted by a laser range finder. The fine tracking of the target by high rate camera and associated image processor allows high precision servo control of the Fast Steering Mirror (FSM) for precise point the laser beam on the designated spot of the target.

This talk highlights technological challenges towards development control system for fine pointing of laser beam. The latest trends of using adaptive optics to improve beam control performance by correcting for atmospheric turbulence effects will be also presented along with the progress of the research carried out so far.

5. **Dr MV Rajasekar (BEL)**

Title: Recent developments in Optical Systems at BEL

Abstract: This talk will cover a set of activities in optical systems at Bharat electronics limited.

6. **Prof Jayanta Sahu (University of Southampton)**

Title: Advanced Fibre technologies for high power fibre laser systems

Abstract: Fibre lasers have become the backbone of high power laser sources over the last decade. In order to fulfil the increasing demand of high output power from a fibre laser, there is a need for optical fibre which can provide large effective area (Aeff) of the fundamental mode (FM) to avoid non-linear effects while simultaneously offering high suppression to higher order modes to preserve the beam quality. This paper will review the

fibre designs for mode area scaling and fibre fabrication techniques for future high-performance fibre laser systems.

7. **Dr KV Reddy (Pritel)**

Title: Product development of Optical Systems: From Laboratory to the Market

Abstract: This talk will cover the process of product development in optical systems, taking a working laboratory prototype and taking it to the market with specific examples.

8. **Prof GK Samanta (PRL, Ahmedabad)**

Title: High power parametric sources of structured optical beams

Abstract: Optical beams of different spatial structures have attracted a great deal of interest due to their variety of applications in science and technology including atomic physics, plasma physics, trapping, micromachining, lithography, and high resolution microscopy. Typically, such optical beams are generated through the spatial modulation of Gaussian beams. In this talk, I will describe our recent results on high power parametric sources producing different structured beams including vortex beams, hollow Gaussian beams and Airy beams. The talk will also include some background on the origin of nonlinear optical effects, and the basics of the structured beams.

9. **Prof Balaji Srinivasan (IIT Madras)**

Title: Early detection and mitigation of Stimulated Brillouin Scattering in high power narrow line width fiber amplifiers

Abstract: High power narrow linewidth sources find numerous applications such as coherent beam combining, LIDAR, and laser guide star. Power scaling of narrow linewidth source through fiber amplifiers is usually limited by nonlinear processes, specifically due to the onset of stimulated Brillouin scattering (SBS). In this talk, we will discuss the use of Karl-Pearson's correlation coefficient to analyze the backscattered radiation resulting in early detection of the onset of SBS. We will also discuss the mitigation of SBS through controlled line broadening of a narrow linewidth source using a phase modulator driven with sinusoidal as well as "optimised" waveforms.

10. **Dr VR Supradeepa (IISc)**

Title: Wavelength agile cascaded Raman Lasers

Abstract: High-power fiber lasers have seen tremendous development in the last decade with output powers exceeding multiple kilowatts from a single fiber. However, power scaling has been largely confined to the narrow emission wavelength region of Ytterbium

due to certain material advantages inherent to it. Other wavelength regions have lagged significantly and many applications rely upon the diversity of emission wavelengths. Currently, Cascaded Raman fiber lasers are the only known wavelength agile, scalable, high power fiber laser technology that can span the wavelength spectrum. In my talk, I address the technology of Cascaded Raman fiber lasers, specifically focused on the newer developments. Our recent work on making broadly tunable high-power cascaded Raman fiber lasers with near complete wavelength conversion will be discussed.