Title and Abstract of Talks and Posters

1) Name: Priyank Sain

Title: RF designing for Quantum Key Distribution

Abstract: The information is encoded on 2.4GHz carrier at the rate of 10Mbps in terms of bpsk modulation and transmitted over a optical carrier using phase modulator.The receiver also generated the similar bpsk data over the 2.4GHz signal.The optically transmit data interfere with the receiver data and depending on the phase difference between the two signals,the corresponding output will be recorded using APD.

2) Name: Sreeprasad A

Title: Investigation of numerical analysis in digital holographic applications

Abstract: Phase measurement is important in optical metrology as it is much more sensitive to the specimen structure than its amplitude. Usually, interferometric methods are used to measure phase by processing fringe patterns. Demodulation of fringe patterns is done using signal processing tools. In the poster, I would be presenting different numerical techniques used for construction and demodulation of fringes patterns.

3) Name: Govind Kumar

Title: Improved detuning in an active Mode Locked Laser

Abstract: We have reported detuning bandwidth up to 820 KHz in active Mode locked fiber laser with fundamental repetition rate of 1.8 MHz. We have used RF amplitude modulated microwave signal for improvement in detuning characteristics.

4) Name: Lokendra Singh Dangi

Title: Development of portable Synchronous Fluorescence Spectroscopy system for early cancer diagnosis

Abstract: The objective of my study is to make a portable system based on synchronous fluorescence spectroscopy technique for the detection and characterization of different cancers. Cancer usually grows slowly and has no symptoms at early stage. Detection ofcancer at its early stage is very difficult as the conventional diagnosis methods are not soeffective. Fluorescence spectroscopy has the potential to be a better diagnostic tool fordetection of cancer at its early stage however it too has limited applicability as the fluorescence spectra of many key tissue fluorophores such as tryptophan, collagen, hemoglobin, reduced form of nicotinamide adenine dinucleotide and flavin adenine dinucleotide display overlapping bands. Synchronous Fluorescence Spectroscopy spectrum is recorded by simultaneously

scanning the excitation and emission wavelengths at a same speed with fixed wavelength offset ($\Delta\lambda$) between them. By doingso one can easily distinguish spectral peaks of different fluorophores which may act as abio markers for differentiating between normal and abnormal tissues. In this project, the previously designed and fabricated monochromators with plane diffraction grating of 1200/mm grove density are calibrated for wavelength through stepper motor controlled by Arduino board. MATLAB based GUI for synchronizing bothmonochromators at different Stokes shifts has been developed. The data acquisitionsystem of synchronous fluorescence spectroscopy consists of Photo Multiplier Tube withHigh voltage power supply, SpectrAcq, discriminator(DM302) has been set up. Finally,system has been interfaced using LabVIEW based VIs. The device has been tested byilluminating with 550 nm wavelength from a white light source using the excitationmonochromator and recording the same through the emission monochromator at zerooffset with acquisition system. The device has also been tested with different offset.

5) Name: Arpita Sinha Roy

Title: Low Jitter Measurement of Laser Linewidth usingBrillouin Induced Self-Heterodyne Method

Abstract: We mathematically analyse and experimentally measure the linewidth of a DFB laser using Brillouin induced self-heterodyne method. We show that Brillouin induced self-heterodyne method reduces the jitter effect as compared to self-heterodyne method.

6) Name: Amar Ghar

Title: Effect of etching solution on femtosecond laser assisted microchannel fabrication in glass

Abstract: Femtosecond laser micromachining has been used to fabricate 3D microchannels inside quartz glass using water and 15% concentrated HF acid etchant solution. Influences of laser parameters i.e. pulse energy, scan speed have been investigated.

7) Name: Shivam Chudasamar

Title: 128x128 photodiode array for target position identification at 1.1µ wavelength.

Abstract: InGaAs/GaAs pin photodiode array of 128x128 is used for detecting 1.1 µm wavelength. Undoped region is having superlattice of GaAs/$In_{0.36}Ga_{0.64}As$ which is responsible for desired 1.1 µm wavelength. Diffusion with zinc for making p^+ region and then calculating the stress on each layers of the layer structure by calculating critical thickness for each layer is the initial work which has been taken care of. Etching with RIE for fabricating the photodiode array and checking the luminescence through spectrometerhas been partially done.

8) Name: Govind Kumar

Title: Photonic crystal lasers

Abstract: This talk will discuss the design, fabrication, experimental study and modelling results of a photonic crystal heterostructure cavity for lasing application. The cavity consists of Rhodamine B dye doped self-assembled colloidal photonic crystal sandwiched between two identical dielectric multilayer stacks. Pumping is done at 532 nm which lies in the absorption band of the dye. In this cavity design, the effect of overlap of defect mode with the band edge of the colloidal photonic crystal aids in achieving enhancement and spectral narrowing in optical emission.

9) Name: Sidharth Maurya

Title: Ultrafast Pulse Shaping Using Interferometry

Abstract: In this work we propose a very flexible time domain MHz pulse shaping using Michelson Interferometer. Instead of conventional mirrors we fitted combination of retro reflectors which is mounted over the linear translational stage to generate the replica of the input pulses at different delay. High resolution delayed pulse pair were generated by controlling the delay between the pulses and between the pulse pair coming from the round trip. These low intensity feedback pulses can be the potential candidate for the STED microscopy and in other applications like bond selective chemistry, optical tweezers, optical imaging etc.

10) Name: Chanchal

Title: Defect detection of electronic circuit using digital holographic interferometry

Abstract: Digital holographic interferometry has been implemented for inspection of defect in an electronic circuit. A simulated defect using Joule's law of heating has been used. Temperature profile on the surface of the defect has been obtained using the digital holographic interferometry. Abel inversion and Lorentz-Lorentz equation have been used for relating the temperature to the reconstructed phase. Goldstein phase unwrapping algorithm has been implemented to obtain continuous variation of the phase distribution over the defect. Experiments are conducted on the electronic circuit. This paper presents the experimental investigation of defect produced in electronic circuit using the hologram reconstruction, two dimensional Goldstein phase unwrapping method, Abel inversion and Lorentz-Lorentz equation.

11) Name: Ankita Jain

Title: Kalman filter based mitigation of impairments in coherent optical communications

Abstract: In recent years, coherent detection and signal processing algorithms have been instrumental in pushing the data rates of optical communication systems beyond 100 Gbps. Signal processing algorithms, implemented with fast DSPs and FPGAs, are used to mitigate several linear and nonlinear impairments of optical signals viz. chromatic dispersion (CD), polarization-mode dispersion (PMD), Frequency offset (FO), laser phase noise (PN), self-phase modulation (SPM), nonlinear phase noise (NLPN), etc. DSP algorithms such as Mth-power algorithm and digital feedforward carrier recovery have been used to estimate PN; digital back propagation (DBP) to mitigate both dispersion and nonlinearity. These algorithms enables transmission at high launch powers and achieve longer transmission distances. At the same time, these algorithms require extensive computational resources which make it difficult for use in real-time systems.

In this talk, we focus on Kalman filters to compensate channel impairments in coherent optical communication systems. Kalman filter (KF) is a computationally efficient estimation filter which is generally used for phase tracking purposes. We describe Kalman filters to compensate both PN, FO and Nonlinearity for QPSK and QAM transmission systems. Simulation results show that Kalman filter performs significantly better compared to DBP other schemes for the same OSNR.

12) Name: Sanyogita Singh

Title: Femtosecond laser based microstructures fabrication for development of Optofludic dye laser.

Abstract: A report on fabrication of microstructures and microholes on polymer material by making use of femtosecond laser based micromachining system and illustrated comparison of grating type structures fabricated inside quartz glass and PDMS sample. The characterization of the device has been performed using optical microscope and profilometery. Parametric study on effect of laser pulse energy, scan speed and depth of focusing has been presented. The findings from this study can be utilized to improve the performance and quality of many photonic devices.

13) Name: Ashitosh V.

Title: Bend loss measurement in optical fiber

Abstract: In FTTH installations, transmission fiber needs to be bent around tight corners of walls, with bend diameter ranging from 5 to 20 mm. Such tight bending causes severe power loss which further varies as a function of wavelength. Several studies--both theoretical and experimental--have been carried out to investigate bend losses in single and multi-mode optical fibers. While the agreement between theory and experiment is excellent at larger bend diameter, the results differ significantly for bend diameters less than 10 mm.

In this work, we use GEBT (Geometrically Exact Beam Theory) toobtain stress tensor of a single-mode fiber that is bent and twisted. The stress tensor is used to calculate modified refractive index of the fiber which is then used to numerically calculate bend losses in the fiber. The computational results are compared with experimentally measured bend loss at different bend diameters (5.5 to 19.5 mm) and pitch values (2-14 mm). The experimental results are in excellent agreement with numerical calculations.