

Brief Biodata

Name: Dr. Manoj Das

Designation:	Senior Scientist	
DP No. and Name:	DP 6.01; Time & Frequency Metrology	
DU No. and Name:	DU 6; Indian Standard Time division	
Email:	manoj.das@nplindia.org	
Date of Joining CSIR-NPL:	20/08/2018	
Phone (office)	+91-11-4560-9240	

Research Area/ Interest

1. Design and development of external cavity diode lasers based on semiconductor diodes
2. Design and development of ultra-stable high-finesse optical cavities
3. Applications based on such ECDL and cavities for Quantum technologies:
 - a. Atomic clocks: Microwave & Optical (currently working on Cs fountain and Yb+ ion trap clock at CSIR-NPL)
 - b. Quantum pressure standard based on cavity refractometers
4. Development of ultra-stable direct optical frequency transfer techniques using optical fibers based on optical interferometers: applications in comparing two optical clocks; to establish microwave to optical link using frequency combs; Frequency ratio measurements of two optical clocks based on different atomic species
5. Earthquake detection based on stable lasers, using widely used internet optical fiber network
6. Development of quantum nodes based on optical nanofibers for technologies like quantum communication and computers
7. Establishing proof-of-concept experiments for PTP (IEEE 1588 std.) based time dissemination using dark telecom optical fibers from CSIR-NPL to local Telecom core/data centers for 5G applications

Educational Qualifications

(Please write latest qualification first)

Degree	Subject	University/ Institute	Year
Ph.D	Physics	University of Electro-Communications, Tokyo, Japan	2005-2011
M.Sc. tech	Electronics	University of Hyderabad, Hyderabad	2004-2005
M.Sc.	Electronics	University of Hyderabad, Hyderabad	2002-2004

B.Sc.	Physics (Hons.)	University of Calcutta, Kolkata	1999-2002
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Academic / Research Experience

Grade / Post	Institute	Duration		Research Field
		From	To	
Post-doctoral researcher (Riken post-doctoral fellowship)	Quantum metrology laboratory, Riken, Japan	May, 2011-	March 2017	Design & Development of Strontium Optical lattice clocks,
Contract Researcher, ERATO project, Govt. of Japan	Space-time engineering research team, Riken, Japan	April, 2017	May, 2017	Design & development of transportable optical lattice clocks

No. of Publications

No. of Publications in SCI Journals	No. of Publications in non-SCI Journals	No. of Publications in Conference Proceedings	Books	Total
6	1	7	1 (book chapter)	15

Selected Publications

<ol style="list-style-type: none"> 1. Frequency ratio of Yb and Sr clocks with 5×10^{-17} uncertainty at 150 seconds averaging time. N. Nemitz, T. Ohkubo, M. Takamoto, I. Ushijima, Manoj Das, N. Ohmae, H. Katori, Nature Photonics, 10 (258). 2. Frequency ration of Sr, Yb, and Hg optical lattice clocks and their applications. M. Takamoto, I. Ushijima, Manoj Das et al, Elsevier, Comptes rendus physique, 16 (489). 3. Cryogenic optical lattice clocks. I. Ushijima, M. Takamoto, Manoj Das, T. Ohkubo, H. Katori, Nature Photonics, 9(185) 4. Spectroscopy of near-surface atoms using an optical nanofiber. K. P. Nayak, Manoj Das, Fam Le Kien, and K. Hakuta, Optics Communications, 285(4698). 5. Measurement of fluorescence emission spectrum of few strongly driven atoms using an optical nanofiber. Manoj Das, A. Shirasaki, K. P. Nayak, M. Morinaga, Fam Le Kien, and K. Hakuta. Optics Express, 18(17154). 6. Frequency stabilization of multiple lasers to a reference atomic transition of Rb. Subham Utreja, Harish Rathore, Manoj Das, Subhasis Panja, Scientific reports 12(20624).
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7. Remote transfer of ultra-stable optical frequency reference using active cancellation of fiber induced phase noise. Manoj Das, IEEE Xplore (accepted) 2022.

Patents

Nil

Current Activities

(Not more than 100 words)

8. Our group is involved in semi-conductor diode based laser and ultra-stable high-finesse cavity design and prototype development at Laser lab in CSIR-NPL.
9. We are working towards employing these two technologies in Cs fountain clock and Yb⁺ ion optical clock at CSIR-NPL.
10. Recently we forayed into the area of earthquake detection using such stable lasers.
11. We are working towards optical fiber based transfer of ultra-stable optical frequencies with high stabilities to remote locations.
12. We are involved in design and development of optical refractometer manometer for pressure standard division at CSIR-NPL.
13. We are working in pilot experiments for using PTP standard for transfer of Indian standard time locally.

Honour(s)/Award(s)/ Fellowship(s)

Vasavi Academy of Education Gold medal, M.Sc., 1st rank, Hyderabad Central University, Hyderabad

Monbukagakusho Scholarship, MEXT Govt. of Japan, Ph.D. University of Electro-communications, Tokyo, Japan

Post-Doctorate (Japan Science Technology Project) fellowship, Govt. of Japan, Prof. Hidetoshi Katori Laboratory, RIKEN, Japan

Contributions to AcSIR

1. PhD course Work “Quantum optics and advanced solid state devices” at CSIR-NPL as part of AcSIR PhD course work Aug. 2022
2. Evaluation of project proposal and review article for PhD students, Nov. 2022
3. Jury member for “National Science Congress” at Kendriya Vidyalaya, Sadiq Nagar, New Delhi, 2022

Membership of Professional Societies/ Institutions

1. Life member: URSI-INRASS
2. Life member: Metrology society of India (MSI)

Any other Information

(Not more than 100 words)

Our work involves analytical calculations (Mathematica/Matlab/Python), theoretical simulations of physics problems (Comsol/Ansys), 3D CAD designing (SolidWorks/Varicad) of mechanical parts, Vacuum systems, Designing optics/optical layout for experiments, Electronics simulation: Analog & Digital (Simetrix), PID feedback/control systems engineering. Optical fiber based designs for time and frequency transfer (Terrestrial mode) for various applications from 5G in telecom to real-time earthquake detection. We are planning to foray into designing FPGA based digital systems like DDS.

All Ph.D. student or short duration (min. 2 months) trainee who wants to carry out hands-on-lab work and are motivated to be a part of exciting science experiments are encouraged to write to us.