Brief Biodata

Dr. Poonam Arora

Designation:	**Principal Scientist & Associate Professor (AcSIR)**	
DP No. and Name:	**(6.01) Time & Frequency Metrology**	
DU No. and Name:	**(6.0) Indian Standard Time**	
Email:	**arorap@nplindia.org**	
Date of Joining CSIR-NPL:	**24.06.2009**	
Phone ***(office)***	**+91-11-4709 1569**	

Research Area/ Interest

Time & Frequency Metrology, R&D on atomic clocks, Quantum technologies, Optics and instrumentation for laser cooling of atoms, Time scale and time dissemination systems.

Educational Qualifications

(Please write latest qualification first)

Degree	Subject	University/ Institute	Year
Ph. D.	**Physics**	**Technical University of Darmstadt, Germany**	**2007**
M. Tech.	**Applied Optics**	**IIT Delhi**	**2004**
M. Sc.	**Physics**	**IIT Delhi**	**2002**
B. Sc.	**Physics, Maths, Electronics**	**Kurukshetra University**	**2000**

Academic / Research Experience

Grade / Post	Institute	Duration		Research Field
		From	To	
Principal Scientist	**CSIR - NPL**	**June 2016**	**Cont.**	**Frequency standards, timescale and time dissemination systems, quantum technologies**
Senior Scientist	**CSIR - NPL**	**June 2012**	**June 2016**	**Cesium fountain, quantum technologies and instrumentation**
Scientist	**CSIR-NPL**	**June 2009**	**June 2012**	**Laser-cooled Cesium fountain atomic clock**
Post-doctoral Fellow	**TU Darmstadt, Germany**	**Jan. 2008**	**Dec. 2008**	**Nanoparticles doped liquid crystals based photonic switching applications**

Research Fellow	**TU Darmstadt, Germany**	**Sep. 2004**	**Dec. 2007**	**Electrically reconfigurable dynamic integrated optical filters**

No. of Publications in SCI Journals	**No. of Publications in non-SCI Journals**	**No. of Publications in Conference Proceedings**	**Books**	**Total**
35	2	70	3	110

No. of Publications

Selected Publications

1. "Detection, Acquisition and Processing of Fluorescence from cold atoms in Cesium fountain primary frequency standard at NPL, India", J. Met. Soc. Ind. 35(4), 521 (2020)
2. "Importance of accurate and traceable time in financial trading and review of time synchronization in Indian capital markets", Int. J. Elec. Engg. 26(4), 165 (2019)
3. "All digital implementation of dual mixer time difference technique for precise phase and frequency measurement", IEEE Explore, doi: 10.23919/URSIGASS.2017.8105343 (2017)
4. "A new time dissemination service with an accuracy of ± 10 ms over public switched telephone network", IEEE Explore, doi:10.23919/URSIGASS.2017.8105342 (2017)
5. "Precise phase and frequency measurement using all digital dual mixer time difference technique", IEEE Explore, doi: 10.1109/FCS.2016.7546811 (2016)
6. "Systematic uncertainty evaluation of the Cesium fountain primary frequency standard NPLI-CsF1", J. Met. Soc. Ind. 32(1), 67 (2016)
7. "An Electronic Sequence Controller for the Cs Fountain Frequency Standard Developed at CSIR-NPL India", Measurement 75, 192 (2015)
8. "A universal driver for vibration free operation of mechanical shutters", Measurement 61, 16 (2015)
9. "Atomic Clocks: A Brief History and Current Status of Research in India", Pramana – J. Phys. 82 (2), 173 (2013)
10. "NPLI Cesium Atomic Fountain Frequency Standard: Preliminary Results", IEEE Trans. Instrum. Meas. 62 (7), 2036 (2013)
11. "Reliable and reusable ultrahigh vacuum optical viewports", Rev. Sci. Instrum. 83, 046104 (2012)
12. "Simple alignment technique for polarisation maintaining fibres", Rev. Sci. Instrum. 82, 125103 (2011)
13. "Development of cesium fountain frequency standard at the National Physical Laboratory, India", Current Science 100, 1393 (2011)
14. "Complementary studies of $BaTiO_3$ nanoparticles suspended in a ferro electric liquid-crystalline mixture", Euro Phys. Lett. 87, 27009 (2009)
15. "Integrated optical Bragg filter with fast electrically controllable transfer function", Opt. Comm. 281, 2067 (2008)

Patents

P. Arora, V. Bharath, S. Yadav, A. Agarwal, V. N. Ojha and A. Sen Gupta, "A portable device for expansion, collimation, focussing and precise alignment of coherent beams" (**Patent Application no.: 201911034775, Filed on 29.08.2019**)

P. Arora, A. Acharya, V. Bharath and A. Sen Gupta, "Cesium Fountain Detection, Data Acquisition and Processing Software" (**Copyright Registered in October 2018, Grant no. SW-11647/2018**)

Trademark on Indian Standard Time **(Filed in August 2020)**

Current Activities

(Not more than 100 words)

Time and Frequency Metrology especially R&D on Cesium Atomic Fountain Primary Frequency Standards, Lasers and Quantum technologies, Optics and instrumentation for laser cooling of atoms, Time Dissemination Methods and Devices, Precise Time Synchronization Solutions, Time Traceability etc.

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

1. **Senior Member, International Union of Radio Science (URSI) 2022**
2. **Elected Fellow, IETE 2022**
3. **Haryana Yuva Vigyan Ratna Award 2017**
4. **Elsevier's Outstanding Reviewer Award 2018**
5. **CSIR-NPL Technology Award -2017**
6. **CSIR-Young Scientist Award 2012**
7. **URSI (International Union of Radio Science) Young Scientist Award 2011**
8. **CPEM Early Career Award 2010**
9. **German Research Foundation (DFG) Fellowship 2004-2007**
10. **Perfect Ten Gold Medal 2004 at IIT Delhi**
11. **German Academic Exchange Service (DAAD) Fellowship 2003**
12. **Haryana State Silver Jubilee Merit Scholarship 1997**

Contributions to AcSIR

- **Students completed PhD (under Supervision / Co-Supervision): 02**
- **Students working for PhD (under Supervision / Co-Supervision): 04**
- **Teaching: Lasers: Basics and Applications**
- **Member of several doctoral advisory committees, examination and evaluation committees**
- **Supervision of B.Tech./M.Tech. projects**
- **Served as member of AcSIR Senate (2012-2015)**

Membership of Professional Societies/ Institutions

- **Member, CCTF Working Group on Primary & Secondary Frequency Standards at BIPM**
- **Member, Technical Committee on Time & Frequency (TCTF) at APMP**
- **Member, Organizing Committee, Asia-Pacific Workshop on Time & Frequency (ATF) at APMP**
- **Member, Horology Sectional Committee at Bureau of Indian Standards (BIS)**
- **Member, Board of Studies, Department of ECE, NIT Delhi**
- **Member, SPIE**
- **Member, Optical Society of America**
- **Member, Indian Physics Association**

- **Life Member of-**
  - **Metrology Society of India (MSI)**
  - **Indian Radio Science Society (InRaSS)**
  - **Indian Laser Association (ILA)**
  - **Indian Women Scientist Association (IWSA)**
  - **Institution of Electronics and Telecommunication Engineers (IETE)**
  - **International Union of Radio Science (URSI).**

Any other Information

(Not more than 100 words)

- **APMP Technical Peer Reviewer at TCTF**
- **NABL Technical Assessor as per ISO 17025**
- **Developed interactive working model of atomic clock**
- **Technologies developed: (available on NPL website)**
  1. FonOclock: ready for technology transfer
  2. Pulse Distribution Amplifier: ready for technology transfer
- **Projects handled:**
  1. Novel optically pumped second Cesium fountain (Principal Investigator) (CSIR Funded)
  2. Frequency offset laser locking for lasers in atomic physics experiments (Principal Investigator) (DST-Young Scientist project)
  3. All digital implementation of dual mixer time difference technique (Principal Investigator) (CSIR-Young Scientist award project)
  4. FonOclock telephone time dissemination with ±10 ms accuracy (Principal Investigator) (CSIR-Fast Track Translation project)
  5. Development of timing laboratories of Legal Metrology Department (LM) traceable to National Time Scale generating IST at five locations and creation of one disaster recovery center. (Key member) (MoCA Funded)
  6. Consultancy project for building secondary timing centres at five locations in India for Department of Legal Metrology (Key Member) (MoCA Funded)
  7. Strengthening of primary timescale and setting up of backup timescale (Key member) (CSIR Funded)