CURRICULUM VITAE SUMMARY

Dr. Mushtaq Ahmed Current Position: 1. H. Adv. to VC RMU, 2.Visiting Physics Professor at IIUI .

DOB: 05-01-1958 **CNIC:** 37405-0559219-5

CONTACT: Phone: +92-51-2708416 **Cell:** +923085554525,email: mahmed5555@yahoo.com,

Ranks / Positions Held:

- Director: National Institute of Lasers & Optronics (NILOP) (Apr.2011- Jan. 2018)
- Project Director NILOP (2011-2013),
- Chairman Board of Studies NILOP (2014-2018)
- HoD (R&D) : Optics Laboratories (2000-2011)

Highest Education: PhD Physics: Quaid - I - Azam University Islamabad Pakistan

Post-Doctorate: University of Sao Paulo, Brazil. (Atomic Clock and Photodynamic Therapy)

Experience: Teaching, Research, Development, Administration, Management, procurement = 30 years

Research &Technical Experience:

A. **Teaching & Research:** 1. Atomic & Molecular Physics 2. Laser Physics 3.High Resolution Laser Spectroscopy 4. Absorption & Fluorescence spectroscopy. 5. Raman Spectroscopy 6. Laser Induced breakdown spectroscopy (LIBS) 7. Agri & Bio-photonics (Bio-Informatics, Bio-Med-Optics) 8. Micro & Nano-Technology and Nanophotonics 9. Terahertz Spectroscopy 10. Plasmonics and Meta-Materials 11. Laser Cooling and Trapping. 12. Optical Lithography 14. Statistical Analysis. 15. Ultra High Vacuum & Cryogenic Technology.

B. **Design and development**: 1. Ultra-short High Power laser systems 2. Light detection and ranging (LIDAR) 3. Time of Flight Mass Spectrometer 4.Fluorescence & Emission Spectrometer 5. Medical Laser Systems.

C. **Established Laboratories**: 1. Laser Spectroscopy 2. Bio-photonics 3. Agri-photonics 3. Terahertz Technology 4. Ultra - short laser system 5. LIDAR 6. Laser crystal growth 7. Laser cooling and trapping 8. Material Optical characterization 9. Clean Room. 10. Micro-nanotechnology.

D**. Computer Software**: 1. Microsoft Office 2. Matlab 3.Labview 4.Partial Least Square (PLS) etc.

Teaching / Academic

1. **Publications: 64, Impact Factor of 136 & 1018 citations, h-index=18, i10-Index =37 @ Mushtaq Ahmed Visiting Professor – Google Scholar**
2. **Taught number of Physics courses at BS, MS and PhD level. Teaching experience of 15 Years.**
3. **Adjunct faculty** member of PIEAS (University) since 2003
4. **Visiting Professor** at IIUI & RIPHAH universities since 2018-2019.
5. **Affiliated NILOP** with PIEAS (university) for PhD degree program in lasers and semiconductor physics.
6. **Chairman** NILOP Board of Studies since April 2012 - Jan. 2018
7. Signed **MoUs** with **19** public sector universities for research collaboration.
8. Participated and delivered lectures in international / national Workshop/Conferences/Symposium : **27**
9. Organized International Workshop/Conferences/Symposium: **12**
10. **Member of High level Review panel (Physical sciences) of HEC research** projects since 2019.
11. **Reviewer of Pakistan Science Foundation (PSF)** research projects since 2012
12. **Reviewer & Member of editorial board of Life Research Journal since Fab. 2022.**
13. **PhD & MS Students** supervision: **4 PhD** completed, **15 MS** Completed

National & International Grants:

- Completed Research and Development Projects: Worth about **1 billion** PRs.

Design & Development of Lasers & Laser based Products:

1. Auto Laser land leveler Transmitter **2**..Photodynamic Therapy (PDT) for cancer treatment
3. Ti:Sapphire femto-second laser system **4.** Low Level Laser Therapy laser system for wound healing etc.

5. HeNe laser system **6.** Nd:YAG Laser system **7**. Laser Target Designator.

Detailed CURRICULUM VITAE

Mushtaq Ahmed
Date of Birth: January 5th, 1958
Sex: Male
Marital Status: Married
CNIC: 37405-0559219-5

A. Contact & Address

Phone: Home : +92-51-2708416, Cell : 03085554525
E-mail: mahmed5555@yahoo.com
Address: House # 206, Street # 11/12, Phase VI, Bahria Town, Islamabad, Pakistan
Current Position: Hon. Adv. to Vice Chancellor Rawalpindi Medical University for Biomedical Optics. Pakistan
High Level Evaluation Panel Member at HEC .
Employment: Director National Institute of Lasers & Optronics (NILOP) (April 2011- Jan 2018)
Designation: Director / Chief Scientist (Retired since Jan. 2018)

B. Education

Degree	Year	Subject	University
PhD	1998	Physics	Quaid-i-Azam University Islamabad, Pakistan
M.Phil	1986	Physics	Quaid-i-Azam University Islamabad, Pakistan
M.Sc	1983	Physics	Quaid-i-Azam University Islamabad, Pakistan
B.Ed	1980	Math & Physics	Punjab University Lahore, Pakistan
B.Sc	1978	Math & Physics	Punjab University Lahore, Pakistan
F.Sc (HSC)	1975	Pre-Engineering	Sargodha Board of Education, Pakistan
Matric (SSC)	1973	Science	Sargodha Board of Education, Pakistan

PhD: Atomic & Molecular Physics (Experimental) Quaid – I – Azam University.

Post-Doctorate: University of Sao Paulo (USP) Brazil (2006-7).

Field of Specialization: Atomic & Molecular Physics: Lasers Physics, Bio-Photonics, Bio-Physics, Micro-nano-Technology, Terahertz Science & Technology, Optical Characterization, Biomedical Optics, Optical Sensors.

C. Awards:

Research productivity award (RPA) Category-B 2013.
Best performance award 2004.
Merit Scholarship in SSC and MSc.

D. Service Profile

S/N	Designation	Place	Duration
1	Scientific Officer (SO)	Optics Labs.	1987-1992
2	Senior Scientific Officer (SSO)	Optics Labs.	1993-2000
3	Principal Scientist / Associate Professor	Optics Labs / PIEAS	2001-2007
4	Head of Division (HoD)	Optics Labs	2000-2007
5	Dy. Chief Scientist / Professor	NILOP / PIEAS	Dec. 2008- Nov. 2016
6	Chief Scientist / Professor	NILOP / PIEAS	Dec. 2016 - Jan 2018
7	Project Director	NILOP	2011-2013
8	Director	NILOP	April 2011- Jan. 2018
9	Head of Establishment	NILOP	April 2011- Jan 2018
10	Visiting Physics Professor	Islamic University	Fab. 2018- June. 2022
11	H. Adv. to VC for Bio-Medical Optics	RMU Univ.	Fab.2019 – Today

E. Laboratories & Facility Established (30 Years Laboratories Experience)

1. Established Laser cooling and trapping laboratory. Laser cooling and trapping of cesium atoms. (Demonstrated Cesium magneto optical trap and characterized).
2. Established Atomic time & Frequency standard Laboratory: Cesium Atomic Time & Frequency Standard fabricated and evaluated.
3. Established Agri-photonics and Bio-photonics Laboratories: Optical diagnostic and treatment in bio-photonics have implemented using Raman and florescence spectroscopic techniques for the detection of dengue, HCV, malaria, breast cancer. This work is done with the collaboration of PAEC Hospital, Allied hospitals of RMU, Mayo Hospital Lahore. Photodynamic therapy laser system was used for the treatment of cancer. Confocal Microscopy for imaging biomedical and agriculture samples.
4. Established Terahertz Science and Technology laboratory: Terahertz radiations are very important as they can pass through the dielectric material and provide excellent opportunity to work in terms of non-destructive and non-contact manner.
5. Plasmonics & Meta-material. (Surface plasmons waves made us able to work beyond the diffraction limit and time constant of the electronic circuits, therefore it is very important field of technology.
6. Optical characterizations. (Elipsometery, Raman spectrometry, absorption spectroscopy, Life time measurement have been implemented successfully).
7. High Resolution Laser Atomic & Molecular Spectroscopy:
    - Absorption and fluorescence spectroscopy
    - Laser Induced Breakdown Spectroscopic (LIBS)
    - Laser Optogalvanic Spectroscopy (LOG) of noble gases
    - Raman Spectroscopy of infectious diseases and qualitative analysis of food and agriculture
    - Time resolved spectroscopy.
8. Established Growth / fabrication of Nd:YAG, Ti:Al_2O_3 Laser Crystals Laboratory.
9. Established Micro-nanotechnology Laboratories.
10. Optical Lithography (Established optical lithography facility for the fabrication of MEMs)
11. Ultrahigh Vacuum & Cryogenic Technology
12. Nanotheronastic facility has been established with collaboration of Norwegian university.

13. <u>Design & Development Achievements</u>

1. Linear & Ring HeNe Laser (Fabrication of HeNe laser is the first step towards ring laser gyro)
2. Q-Switched Nd:YAG Laser System with energies 10 mJ, 50 mJ and 100 mJ.
3. Mode Lock Nd:YAG laser (Mode lock lasers have high pulse intensity and having important applications in micromachining, surface treatment, laser scalpel, microscopy, spectroscopy and more over frequency metrology and ring laser sensors)
4. Mode Lock Ti:Al_2O_3 femtosecond Laser (First step towards TeraWatt and GigaWatt laser system, applications includes table top electron acceleration, table top X-rays generation, ultrafast spectroscopy, Tera Hertz generation , defense etc)
5. CCD based Optical spectrometer (very useful for the research and also for the universities for the detection of fluorescence. It has been at a very low cost at about one third of international market)
6. Time of Flight mass spectrometer (One of the most important component of mass spectrometry with very high resolution.
7. Photodynamic Therapy (PDT) laser for cancer treatment (PDT) laser is fabricated and delivered at a number of hospital at half of the cost as compared to international market. Due to this development the most advanced/modern cancer treatment has been made possible in the country).
8. Low level laser therapy (LLLT) for wound healing and mouth ulcer treatment. (This system is working at PAEC General Hospital and results are very fascinating). Another LLLT system was developed for the treatment of Piles.
9. Auto Laser land leveler Transmitter.
10. Designed and developed hand held fluorometer for the diagnostic of biological, agriculture and food samples. The project was funded by Pakistan Science Foundation, Pakistan.
11. Remote sensing: Designed and developed Light detection and Ranging (LIDAR) System.

F. Academics

Teaching

A. Undergraduate Level. **Physics (Lecturer)**

- Pakistan Air Force College Rawalpindi Pakistan: 1983-1986. **(Full Time)**
- Hamdarad University Islamabad Pakistan: 2002-2004 (Part Time)

B. Graduate Level (BS): International Islamic University Islamabad as Visiting Prof of Physics.

- (i) Solid State Physics (ii) Physics at Nanoscale (iii) Modern Physics (iv) Special theory of Relativity , (iv) Heat & Thermodynamics, Jan.2018 – till date

C. Graduate Level (MSc): International Riphah University Islamabad, Pakistan ,
Methods of Experimental Physics (MSC) Sep. 2019- July 2020 (Visiting Professor)

D. Postgraduate Level

1. Allama Iqbal Open University (AIOU) Islamabad Pakistan (as a tutor / supervisor) (Part Time)

- Atomic & Molecular Physics (M. Phil) 2004-2006.
- Laser & Optics (MSc) 2004
- Laser Physics (M.Phil.)" 2005.

2. Pakistan Institute of engineering and applied sciences (PIEAS) Islamabad Pakistan (Adjunct Faculty member 2003- till date)

- Modular MEMS Fabrication (MS) 2002-2005.
- Optical Properties of Materials (MS & PhD) 2005- 2006.
- Atomic and molecular Physics. (2014-2018)

3. National Institute of lasers & Optronics (NILOP) Islamabad Pakistan (2008-2018) (Full Time)

- Plasmonics and Metamaterial (PhD)
- Advanced Atomic & Molecular Physics (PhD)
- Bio-Photonics
- Optical Sensors

4. Student Supervision

- Supervisied student **Internship Projects**.
- Supervised research project of **15 M.Phil** students as a supervisor / co-supervisor.
- **PhD students' supervision:** 4 students completed PhD .

1. Bilal Khan . PhD Thesis Title: Raman spectroscopy of dengue infected plasma. Completed. 2017
2. M. Tauseef Asim: PhD Thesis Title: Modeling and simulations of meta-material microwave devices completed in 2016.
3. M. Anwar: PhD Thesis Title: Laser cooling and trapping of cesium atoms. Completed in 2016
4. M. Mumtaz: PhD Thesis Title: Ultrafast terahertz spectroscopy of solid state materials. Completed in 2021

Adjunct Member, Visiting professor, Research Project Reviewer, Reviewer & Member of Editirial Board of Research Journals

1. Adjunct faculty member of PIEAS since 2003.
2. Visiting professor at International Islamic University Islamabad, since Jan. 2018
3. Visiting Professor at International Riphah University Islamabad since Sep. 2019 – July 2020.
4. H. Advisor to VC Rawalpindi Medical University for Bio-Medical Optics, since March 2019.
5. Supervisor and Tutorship at Allama Iqbal Open University (AIOU) since 2004
6. Visiting Professor at Hamdard University Islamabad 2000-2004
7. Chairman Board of Studies NILOP 2014-2018.
8. Member of Board of Faculty of PIEAS 2014- 2018.
9. Member of Technical Committee of International Nathiagali Summer College 2012-2016
10. Affiliated NILOP with PIEAS for PhD program in Laser & Semiconductor physics.
11. Signed MoUs with 19 public sector universities for student and faculty research collaborations
12. **Reviewer of Pakistan Science Foundation (PSF**) research projects.
13. **Member of High Level Review panel** (Physical Sciences) of HEC research and development projects
14. Reviewer of International journal of Raman Spectroscopy.
15. Reviewer of International Micro-chemical Journal
16. **Reviewer & Member of editorial board of Life Research Journal**
17. Approved HEC PhD supervisor.

G. International Collaboration:

1. Established link with University of Sao Paulo Brazil and stated collaboration in the field of Laser Photo-Dynamic therapy for cancer treatment, Laser cooling & trapping and Atomic clock as a time standard.
2. Entered into Collaboration & TOT for Nd: YAG fabrication in the country with SIOM China
3. Established link with Lund University Sweden and started a collaborative project development of optical mammography.
4. Established link with HungZo university China and started collaborative work on plasmonic and metamaterial
5. Established collaboration with Jena University, Germany and started work on Raman Spectroscopy of biological samples.
6. Established collaboration with Huazhong University of Science & Technology Wuhan China and started work on quantum optics.
7. Established collaboration with Norwegian university for nano-theranostic facility.

H. Research & Development Projects (Grants are awarded by PSDP, MoST , PSF, HEC ,etc)

#	Project	Position	Worth in million (PKR)
1	Establishment of National Institute of Lasers & Optronics (NILOP)	Project Director (P.D) / Principal Investigator (P.I) (2012-2014)	734
2	Design and development of Quantum devices (LED & Laser Diode)	Director	195
2	Development of Fluorosensor for in vivo Characterization of skin tumors	Co-PI	1.8
3	Establishment of LPCVD facility at NILOP for MEMs fabrication.	P.D	80
4	Capacity building of nanotheronastic facility in Pakistan Pak – Norway	Director	51
5	Design and development Ring Down Cavity spectrometer	Director	2.8
6	Macrophage targeted thiolated nanocarriers: next generation of antimicrobial drug development	Director	5.0
7	Diffuse reflectance spectroscopic studies for the diagnosis of breast cancer at early stage.	Co-PI / Director	8.5
8	Development of Nd:YAG crystal growth facility	Co-PI	50
9	Designed and fabricated Nano- generator	Director	02
10	Designed & developed polymer based EMI Coating	Director	02
Total			**1032.1**

I. International Publications: 64

IF = 136, Citation = 951, h-index = 18, i10-index = 34

#	Publication	IF	Cited
1	M.Z. Iqbal, **M. Ahmad**, N. Baber, N. Zafar "Controversy regarding the 0.85-eV deep hole level in GaP" J. Appl. Phys., 1987, 61(7), 2690–2693, 10.1063/1.337908..	2.286	2
2	**M. Ahmed**, M.A. Zia, M.A. Baig, B. Suleman "Two-photon laser-optogalvanic spectroscopy of the odd-parity Rydberg series of krypton" J. Phys. B At. Mol. Opt. Phys., 1997, 30(9), 2155–2165, 10.1088/0953-4075/30/9/016. 14 may	0.833	21
3	**M. Ahmed**, M.A. Baig, B. Suleman "Laser optogalvanic spectroscopic studies of xenon" J. Phys. B At. Mol. Opt. Phys., 1998, 31(17), 4017–4028,	0.833	9
4	**M. Ahmed**, T. Riffat "Laser-Induced thermal blooming in C 60 -Toluene" J. Mod. Opt., 2004, 51(11), 1663–1670, 10.1080/09500340410001658815. 3	1.544	6
5	M. Waris, **M. Ahmed** "Adhesive-free bonding of Zerodur glass to silicon" Applied Surface Science, 2006, 252(20), 7327-7330, 10.1016/j.apsusc.2005.08.087.	6.128	3
6	S.M.J. Akhtar, M. Lappschies, D. Ristau, M. Ashraf, **M. Ahmed** "Growth and fluorescence measurements of neodymium: Yttrium Aluminum Garnet, neodymium fluoride, Ti:Sapphire, ytterbium fluoride and mixture of neodymium fluoride with ytterbium fluoride thin films" Thin Solid Films, 2007, 515(20-21), 7958–7965.	2.24	1
7	S.T. Müller, D.V. Magalhães, A. Bebeachibuli, T.A. Ortega, **M. Ahmed**, V.S. Bagnato "Free expanding cloud of cold atoms as an atomic standard: Ramsey fringes contrast" J. Opt. Soc. Am. B, 2008, 25(6), 909-914, 10.1364/JOSAB.25.000909.	2.18	13

8	J.R. Garbin, D.M.B.P. Milori, D. V Magalhaes, M. Anwar, **M. Ahmed**, A. Bebeachibuli, S.T. Muller, V. S. Bagnato "Measurement of the absolute total electron impact cross section on Cs atoms using a magnetooptical trap" Laser Phys., 2008, 18(2), 144–148, 10.1134/s1054660x08020084.	1.333	0
9	**M. Ahmed**, D. V. Magalhães, A. Bebeachibuli, S.T. Müller, R.F. Alves, T.A. Ortega, John Weine,; Vanderlei S. Bagnato "The Brazilian time and frequency atomic standards program" An. Acad. Bras. Cienc., 2008, 80(2), 217–252	1.28	15
10	A. Rauf, M. Mehmood, M. Ahmed, M. ul Hasan, M. Aslam "Effects of ordering quality of the pores on the photoluminescence of porous anodic alumina prepared in oxalic acid" J. Luminescence., 2010, 130(5), 792–800, 10.1016/j.jlumin.2009.11.035.	2.085	33
11	A. Rehman, S. Firdous, M. Nawaz, **M. Ahmad** "Optical parameters measurement for diagnostic and photodynamic therapy of human cervical adenocarcinoma (HeLa) cell line" Laser Phys., 2012, 22(1), 322–326, 10.1134/S1054660X12010161.	1.333	14
12	A. Khurshid, S. Firdous, L. Ahmat, J. Ferraria, J.D. Vollet-Filho, C. Kurachi, V. S. BagnetoM. Nawaz M. Ikram **M. Ahmad** "In vivo study of laser irradiation of fractionated drug administration based mechanism for effective photodynamic therapy in rat liver" Laser Phys., 2012, 22(1), 317–321, 10.1134/S1054660X12010070.	1.333	12
13	S. Shahzada, P. Ijaz, M. Shah, S.-U.- Haq, **M. Ahmed**, A. Nadeem "Photoionization studies from the 3p P2 excited state of neutral lithium" J. Opt. Soc. Am. B., 2012, 29(12), 3386-3392 10.1364/JOSAB.29.003386.	2.18	9
14	A. Rehman, S. Anwar, S. Firdous, **M. Ahmed**, R. Rasheed, M. Nawaz "Dengue blood analysis by Raman spectroscopy" Laser Phys., 2012, 22(6), 1085–1089, 10.1134/S1054660X12060072.	1.333	27
15	B. Hussain, **M. Ahmed**, M. Nawaz, F. Gul "Self-focusing in transformer oil with external electric field" Laser Phys., 2012, 22(12), 1815–1818, 10.1134/S1054660X1212002X.	1.333	4
16	B. Hussain, **M. Ahmed**, M. Nawaz, M. Saleem, M. Razzaq, M. Aslam Zia, M. Iqbal "Simultaneous determination of thickness and refractive index based on time-of-flight measurements of terahertz pulse" Appl. Opt. , 2012, 51(21), 5326–30, 10.1364/AO.51.005326.	1.961	19
17	S. Firdous, M. Nawaz, M. Ikram**, M. Ahmed** "In vitro study of cell death with 5-aminolevulinic acid based photodynamic therapy to improve the efficiency of cancer treatment" Laser Phys., 2012, 22(3), 626–633, 10.1134/S1054660X12030048.	1.333	14
18	S. Firdous, M. Nawaz, **M. Ahmed**, S. Anwar, A. Rehman, R. Rashid, A. Mahmood "Measurement of diabetic sugar concentration in human blood using Raman spectroscopy" Laser Phys., 2012, 22(6), 1090–1094, 10.1134/S1054660X12060023.	1.333	36
19	S. Firdous, **M. Ahmed**, A. Rehman, M. Nawaz, S. Anwar, S. Murtaza "Transmission spectroscopy of dengue viral infection" Laser Phys. Lett., 2012, 9(4), 317–321, 10.1002/lapl.201110126.	1.884	15
20	B. Hussain, M. Nawaz, **M. Ahmed**, and M. Yasin Akhtar Raja "Measurement of thickness and refractive index using femtosecond and terahertz pulses" Laser Phys. Lett., 2013, 10(5), 55301, .	1.884	16
21	M. Saleem, M. Bilal, S. Anwar, A. Rehman, **M. Ahmed** "Optical diagnosis of dengue virus infection in human blood serum using Raman spectroscopy" Laser Phys. Lett., 2013, 10(3), 35602, 10.1088/1612-2011/10/3/035602.	1.884	68
22	A. Nadeem, M. Shah, S. Shahzada, **M. Ahmed**, S. Haq "Experimental investigation of photoionization cross section for the 3d 2D excited states of lithium and sodium" Eur. Phys. J. D, 2013, 67(9), 196, 10.1140/epjd/e2013-40310-4.	1.366	4
23	B. Hussain**, M. Ahmed**, G. Hussain, M. Saleem, M. Nawaz "Analog processing based vibration measurement technique using michelson interferometer" Photonic Sensors, 2013, 3(2), 137–143, 10.1007/s13320-012-0061-8.	1.120	6
24	M. Anwar, M. Faisal, **M. Ahmed** "An experimental investigation of the trap-dynamics of a cesium magneto-optical trap at high laser intensities" Eur. Phys. J. D, 2013, 67(12), 270, 10.1140/epjd/e2013-40510-x.	1.366	7
25	A. Nadeem, M. Shah, S.U. Haq, S. Shahzada, M. Mumtaz, A. Waheed, M. Nawaz, **M. Ahmed**, M. A. Baig "Three-step laser excitation of the odd-parity 5s5d 3D → 5snf 3F states of cadmium" Eur. Phys. J. D, 2014, 68(7), 192, 10.1140/epjd/e2014-50136-1.	1.366	6

26	T.M. Khan, M. Zakria, **M. Ahmad**, R.I. Shakoor "Optoelectronic study and annealing stability of room temperature pulsed laser ablated ZnSe polycrystalline thin films" J. Lumin., 2014, 147 (1), 97–106, 10.1016/j.jlumin.2013.10.064.	3.28	27
27	M. Anwar, D. V Magalhães, S.T. Müller, M. Faisal, M. Nawaz, **M. Ahmed** "Revisiting the capture velocity of a cesium magneto-optical trap: model, simulation and experiment" Laser Phys., 2014, 24(12), 125502, 10.1088/1054-660X/24/12/125502.	1.333	8
28	M. Bilal, M. Saleem, S.T. Amanat, H.A. Shakoor, R. Rashid, A. Mahmood**, M. Ahmed** "Optical diagnosis of malaria infection in human plasma using Raman spectroscopy" J. Biomed. Opt., 2015, 20(1), 17002, 10.1117/1.JBO.20.1.017002.	2.785	48
29	M. Tauseef Asim, **M. Ahmed** "Metamaterial inspired microstrip antenna investigations using metascreens" Int. J. Antennas Propag., 2015 Volume 2015 (4),, 1–9, 10.1155/2015/236136.	1.207	8
30	A. Nadeem, M. Shah, S. Shahzada**, M. Ahmed**, S.U. Haq "Spectroscopic Investigation of the Odd-Parity 3d 2 D → nf 2 F Transitions of Neutral Sodium" J. Appl. Spectrosc., 2015, 82(5), 719–725, 10.1007/s10812-015-0170-4.	5.074	3
31	T.M. Khan, M. Zakria, R.I. Shakoor, M. Raffi, **M. Ahmad** "Mechanisms of composite-hydroxide-mediated approach for the synthesis of functional ZnO nanostructures and morphological dependent optical emissions" Adv. Mater. Lett., 2015, 6(7), 592–599, 10.5185/amlett.2015.5876.	1.15	7
32	R. Ullah, S. Khan, A. Khan, M. Saleem, H. Ali, M. Bilal, **M. Ahmed** "Infant gender-based differentiation in concentration of milk fats using near infrared Raman spectroscopy" J. Raman Spectrosc., 2017, 48(3), 363-367, 10.1002/jrs.5047.	2.000	14
33	S. Khan, R. Ullah, M. Khurram, H. Ali, A. Mahmood, A. Khan, **M. Ahmed** "Evaluation of Raman spectroscopy in comparison to commonly performed dengue diagnostic tests" J. Biomed. Opt., 2016, 21(9), 95005, 10.1117/1.JBO.21.9.095005.	2.785	14
34	S. Khan, R. Ullah, A. Khan, N. Wahab, M. Bilal**, M. Ahmed** "Analysis of dengue infection based on Raman spectroscopy and support vector machine (SVM)" Biomed. Opt. Express, 2016, 7(6), 2249-2256, 10.1364/BOE.7.002249.	3.921	89
35	M. Bilal, M. Saleem, M. Bilal, R. Ullah, M. Khurram, S. Khan, H. Ali, **M. Ahmed** "Raman spectroscopy based discrimination of NS1 positive and negative dengue virus infected serum" Laser Phys. Lett., 2016, 13(9), 95603, 10.1088/1612-2011/13/9/095603.	1.884	12
36	M. Bilal, M. Bilal, S. Tabassum, M. Saleem, H. Mahmood, U. Sarwar, H. Bangush, F. Munir, M. Aslam Zia, **M. Ahmed**, S. Shahzada, E. Ullah Khan "Optical Screening of Female Breast Cancer from Whole Blood Using Raman Spectroscopy" Appl. Spectrosc., 2017, 71(5), 1004–1013, 10.1177/0003702816667516.	2.064	13
37	M. Bilal, M. Saleem, M. Bilal, T. Ijaz, S. Khan, R. Ullah, A Raza, M Khurram, W Akram**, M Ahmed** "Raman spectroscopy-based screening of IgM positive and negative sera for dengue virus infection" Laser Phys., 2016, 26(11), 115602, 10.1088/1054-660X/26/11/115602.	1.333	9
38	S. Shahzada, M. Shah, S.U. Haq, M. Nawaz, **M. Ahmed**, A. Nadeem "Spectroscopic investigation of the 3d 2D → nf 2F transitions in lithium" Spectrochim. Acta - Part B At. Spectrosc., 2016, 119, 83–90, 10.1016/j.sab.2016.03.013.	3.086	0
39	M. Saleem, **M. Ahmed**, M.A. Ch., B. Suleman "Laser enhanced the formation of LiH particles inside crossed arms heat pipe oven" Optik, 2016, 127(19), 7444–7449, 10.1016/j.ijleo.2016.05.075.	2.85	0
40	M. Mumtaz, A. Mahmood, S.D. Khan, M.A. Zia, **M. Ahmed**, I. Ahmad "Investigation of Dielectric Properties of Polymers and their Discrimination Using Terahertz Time-Domain Spectroscopy with Principal Component Analysis" Appl. Spectrosc., 2017, 71(3), 456-462, 10.1177/0003702816675361.	2.087	30
41	S. Mehboob, M. Mehmood**, M. Ahmed**, J. Ahmad, M.T. Tanvir, I. Ahmad "Terahertz time domain spectroscopy of hydrothermally synthesized boehmite and ammonium dawsonite nanostructures" Infrared Phys. & Technol., 2016, 78, 200–208, 10.1016/j.infrared.2016.08.007.	2.379	8

42	H. Ali, H. Nawaz, M. Saleem, F. Nurjis, **M. Ahmed** "Qualitative analysis of desi ghee, edible oils, and spreads using Raman spectroscopy" J. Raman Spectrosc., 2016, 47(6), 706–711, 10.1002/jrs.4891.	2.000	26
43	M. Bilal, R. Ullah, S. Khan, H. Ali, M. Saleem, **M. Ahmed** "Lactate based optical screening of dengue virus infection in human sera using Raman spectroscopy" Biomed. Opt. Express, 2017, 8(2), 1250-1256, 10.1364/BOE.8.001250.	3.921	11
44	M. Bilal, M. Bilal, M. Saleem, M. Khurram, S. Khan, R. Ullah, Hina Ali, **Mushtaq Ahmed**, Shaista Shahzada, Ehsan Ullah Khan "Raman spectroscopy-based investigation of molecular changes associated with an early stage of dengue virus infection" Laser Phys., 2017, 27(4), 45601, 10.1088/1555-6611/aa5a94.	1.333	3
45	R. Ullah, S. Khan, H. Ali, M. Bilal, M. Saleem, A. Mahmood, **M. Ahmed** "Raman-spectroscopy-based differentiation between cow and buffalo milk" J. Raman Spectrosc., 2017, 48(5), 692–696, 10.1002/jrs.5103.	2.000	28
46	H. Nawaz, M. Saleem, **M. Ahmed** "Prediction of viral loads for diagnosis of Hepatitis C infection in human plasma samples using Raman spectroscopy coupled with Partial Least Squares Regression analysis" J. Raman Spectrosc., 2017, 48(5), 697–704, 10.1002/jrs.5108.	2.000	42
47	S. Mehboob, M. Mehmood, **M. Ahmed**, J. Ahmad, M.T. Tanvir, I. Ahmad, Syed Mujtaba ulHassan "Terahertz time domain spectroscopy of amorphous and crystalline aluminum oxide nanostructures synthesized by thermal decomposition of AACH" Mater. Chem. Phys., 2017, 191, 62-69, 10.1016/j.matchemphys.2017.01.030.	3.408	10
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49	Ayyaz Amin, Nimrah Ghouri, Safdar Ali, **M.Ahmed**, M. Saleem and Javaria Qazi "Identification of new spectral signatures associated with dengue virus infected sera" Identification of new signature. J. Raman Spectrosc., 2017, 48(5), 705–710, 10.1002/jrs.5110.	2.000	23
50	Saranjam Khan, Rahat Ullah, Asifullah Khan, Anabia Sohail, Noorul Wahab, Muhammad Bilal and **Mushtaq Ahmed** "Random forest based evaluation of Raman spectroscopy for dengue fever analysis" Appl. Spectrosc., 2017, 71(9) , 2111-2117, 10.1177/0003702817695571.	2.085	33
51	Saranjam Khan, Rahat Ullah, Samina Javaid, Shaheen Shahzad, Hina Ali, Bilal Muhammad, Saleem Muhammad, **Mushtaq Ahmed** "Raman spectroscopy combined with principal component analysis for screening of nasopharyngeal cancer in the human blood sera." Appl. Spectrosc., 2017, 71(11), 2497-2503, 10.1177/0003702817723928.	2.085	21
52	Maria Bilal, M Bilal, M Saleem, Saranjam Khan, Rahat Ullah, Kiran Fatima, **M Ahmed**, Abbas Hayat, Shaista Shahzada, Ehsan Ullah Khan "Raman spectroscopy–based screening of hepatitis C and associated molecular changes. " Laser Phys. Lett., 2017, 14(9), 95602, 10.1088/1612-202X/aa7d37.	1.884	3
53	Naveed Ahmad, M Saleem, H Ali, M Bilal, Saranjam Khan, Rahat Ullah, **M Ahmed**, S Mahmood "Defining the temperature range for cooking with extra virgin olive oil using Raman spectroscopy." Laser Phys. Lett., 2017, 14(9), 95603, 10.1088/1612-202X/aa7d3e.	1.884	10
54	M. Bilal, M. Saleem, Maria Bial, Saranjam Khan, Rahat Ullah, Hina Ali, **M. Ahmed**, Masroor Ikram "Raman spectroscopy based screening of IgG positive and negative sera for dengue virus infection" Laser Phys. Lett., 2017, 14(11), 115601, 10.1088/1612-202X/aa829e.	1.884	1
55	Saira Tariq, Muhammad Bilal, Shaheen Shahzad, Shamaraz Firdous, Uzma Aziz, **Mushtaq Ahmed** "Diagnosis of thalassemia and iron deficiency anemia using confocal and atomic force microscopy" Laser Phys. Lett., 2017, 14(11), 115703, 10.1088/1612-202X/aa8bca.	1.884	4

56	M Saleem, N Ahmed, H Ali, M Bilal, S Khan, R Ullah, **M Ahmed**, S Mahmood "Investigating temperature effects on extra virgin olive oil using fluorescence spectroscopy" Laser Phys., 2017, 27(12), 125602, 10.1088/1555-6611/aa8cd7.	1.333	23
57	N Ahmed ,M Saleem, **M, Ahmed** and S Mahmood " Heating effect of desi ghee using Raman Spectroscopy" Applied Spectroscopy " 2018, 72 (6) 833-846 DOI: 10.1177/0003702818763331	2.085	10
58	B M Atta , M Saleem, H Ali, H M I Arshad and **M Ahmed** " Chlorophyll as a biomarker for early disease diagnosis" Laser Physics, 2018, 28 (6) , 065607 (1-7)	1.333	10
59	M Mumtaz, M A Mahmood, R Rashid, **M Ahmed**, M Aslam Zia and I Ahmad "Investigation of the optical and conductive properties of antimony-doped titanium dioxide using terahertz time-domain spectroscopy" Laser Physics Letter (LPL), 2018, 15, (10), 105603,pp6	1.884	8
60	M. Mumtaz, M Ihsan Mahmood, Sabih Din Khan, M.A. Zia**, M. Ahmed** and I Ahmed "Experimental Measurement of Temperature-dependent Sellmeier Coefficients and Thermo-optic Coefficients of Polymers in Terahertz Spectral Range", Optical Material .2019, 91, 126 – 129.	2.779	2
61	M. Mumtaz, M Ihsan Mahmood, Sabih Din Khan, M.A. Zia**, M. Ahmed**, I Ahmed "Doping effects on optical and conductive properties of titanium dioxide in terahertz range" Optical Material 2019, 96, 109357 (1-4)	2.779	2
62	N Farman, M Mumtaz, M Ihsan Mahmood, Sabih Din Khan, M A Zia, M Raffi, **M. Ahmed** and I Ahmed "Investigation of optical and dielectric properties of polyvinyl chloride and polystyrene blends in terahertz regime" Optical Material **2020,99, 109534.**	2.779	9
63	M. Mumtaz , M Ahsan Mahmood, M. Arsalan, Sabih D Khan, M Aslam Zia , **M. Ahmed** and I Ahmed, " Experimental measurement of temperature dependent thermo-optical parameter of different type of olive oil using terahertz time-domain spectroscopy" J. Infrared, millimeter and THz wave , **2020, 41, 1181.**	1.768	0
64	M. Mumtaz , M Ahsan Mahmood, Sabih D Khan, M Aslam Zia, Amjid Iqbal , **M. Ahmed** and I Ahmed " Optical and conductive properties of Antimony and Bismuth co-doped titaniumdioxide in terahertz range" Infrared Physics & Technology ,**2021**, **112, 103570.**	2.379	1
	TOTAL	**136**	**1018**

International Research Publications with impact factor & citations can be visualized at Google Scholar @ mushtaq ahmed visiting professor

J. Conference Proceedings: 07

#	Description
1	Muhammad Mumtaz ; M. Ahsan Mahmood ; Sabih D. Khan ; M. Aslam Zia ; **Mushtaq Ahmed** ; Izhar Ahmad, "Enhancement of optical properties of titanium dioxide with doping in THz regime" published in 45th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz), Buffalo, USA, (2020)
2	Muhammad Mumtaz ; M. Ahsan Mahmood ; Sabih D. Khan ; M. Aslam Zia ; **Mushtaq Ahmed** ; Izhar Ahmad, "Control of random fluctuations in terahertz time-domain spectrometer" Published 45th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz), Buffalo, USA, (2020)
3	**M. Ahmed**, M Bilal, M. Saleem, S. Khan, R Ullah, H Ali, F. Nurjis "Role of Raman spectroscopy in bio and agriculture as an optical diagnostic tool" PIERS 2016 8-11 Aug. 2016 Page(s) 2326 Shanghai China.
4	**M. Ahmed** , I Ahmed, M Mumtaz, M.A. Zia , M.A. Mahmood and S D Khan "Measurement of Dielectric Properties of Polymers and Semiconductor Materials Using Terahertz Time-domain Spectroscopy along with Principal Component Analysis" PIERS 2016 8-11 Aug. 2016 page (s) 3345 SHANGHAI CHINA.

5	M. Anwar, Rameezul Islam, F. Faisal, M. Nawaz and **M. Ahmed**. "Experimental nonlinear dynamical studies in cesium magneto Optical trap using time series analysis "4th International Advances in Applied Physics & Materials Science Congress & Exhibition (APMAS 2014)., At Fethiye, Turkey. 24-27 April, 2014. AIP Conference Proceeding volume 1653, no.1, page 10 (year of publication 2015).
6	**M. Ahmed**, M. Waris, T. Nasreen and S.J. Bukhari; Growth and Spectroscopic Studies of Nd:YAG and Undoped YAG Crystal;Proceedings of 1St International Conference on Frontiers of Advance Engineering Materials (FAEM-2004) "20-22 Sep. 2004 Lahore, Pakistan, 466.
7	**M. Ahmed** and N. Anjum; Spectroscopic measurement of total gas pressure and parial pressure of He:Ne in the sealed discharge tube. Proceeding of 2nd International on Frontiers of Advance Engineering Materials (FAEM-2005) Sep. 2005.

K. Workshop /Symposium / Conferences Presentation and Participation: 27

Serial #	Description
1	**M. Ahmed** and B. Suleman "Laser optogalvanic spectroscopy ", 2nd Symposium on Frontiers in Physics, Dec. 1988, Quaid-i-Azam university, **Islamabad, Pakistan**.
2	**M. Ahmed** and B. Suleman "Two step excitation and fluorescence studies of iodine molecule", 91 Workshop on Laser and Laser Applications Nov. 91 **Shanghai China**.
3	**M. Ahmed** and B. Suleman " Laser optogalvanic studies of 2sS1 I npP1 Rydberg states of atomic helium", 91 Workshop on Laser and Laser Applications Nov. **91 Shanghai China**
4	Participated in 3rd and 4th Symposium on Frontiers in Physics**,** 1991 and 1992, Quaid-i-Azam University, Islamabad, Pakistan.
5	Participated in 10th , 12th -14th, 18th, 20th, 22nd, 24th and 29thNathiagali Summer College on Physics and Contemporary needs 1985, 1987-1989,1993,1995, 19971999 and 2004, Pakistan.
6	**M. Ahmed** and B. Suleman "Two photon laser optogalvanic spectroscopy of krypton and xenon" 2nd Symposium on Frontiers in Physics, Feb. 1998, Quaid-i-Azam university, **Islamabad, Pakistan**.
7	**M. Ahmed**, N.K. Piracha, M.A. Mir, B. Suleman and M.A. Baig " Laser optogalvanic spectroscopy of inert gases " Winter college on Spectroscopy and Applications 8- 26 Feb. 1999 ICTP **Treste Italy**.
8	**M. Ahmed** and T. Riffat "Laser induced thermal blooming in C60 – Toluene" 9th National Symposium Frontier in Physics " Jan. 28-30 2003 **Lahore Pakistan.**
9	**M. Ahmed**, M. Waris, T. Nasreen and S.J. Bukhari "Growth & Spectroscopic Studies of undoped and Nd:YAG single crystal" International Conference on Frontier of Advance Engineering Materials "20-22 Sep. 2004 **Lahore, Pakistan**.
10	Participated in the Winter School on Quantum Fluid Gases 13-25 Aug. **2007 Brasilia Brazil.**
11	Participated in the 19thinternational workshop on **Laser Physics July 5-9, 2010, Foz Do Iguacu, Brazil.**
12	**M. Ahmed**, M.Saleem, S Firdous , M. Nawaz, " Optical diagnostic of dengue viral infected blood serum " Workshop on Dengue Viral infection **31st May 2012 NCP Islamabad.**
13	**M. Ahmed**, M. Saleem, A Rehman ,S Anwar,S Khan S Firdous A Ehsan, R Ullah and M. Nawaz , " Workshop on PDT" 1st April 2014 PIEAS Islamabad
14	**M. Ahmed et al** "Laser cooling and trapping of atom and molecule" 38th International Nathaigali Summer College **24th June 2013**
15	**M. Ahmed** " Role of laser in Agri and Bio- photonics" at National Institute of agriculture and biology **NIAB Faisalabad 20th Oct. 2014**
16	**M. Ahmed** " Research & Development activities at NILOP" Agriculture university Faisalabad **20th Oct 2014**
17	**M. Ahmed "**Metamaterial and plasmonics" 39th International Nathaigali Summer College **4-16 Aug. 2014**
18	**M. Ahmed** "Introduction to research activities at NILOP "International workshop on GaN LEDs and Laser Diodes**"** NILOP Islamabad **5-6 March 2015**

19	**M. Ahmed etal** " Fabrication and evaluation of cesium beam clock" **16-21 march 2015 Tunis Tunis**
20	**M. Ahmed etal** " Raman spectroscopy of viral infected HCV sera" **22-25 May (2015)SPIE south photonics Rio de Janeiro Brazil**
21	**M. Ahmed** "40th International Nathaigali Summer College Islamabad , **3-15 Aug. 2015**
22	**M. Ahmed** "Research Activities at NILOP "Symposium lasers and their applications" **7-9 Dec. 2015**
23	**M. Ahmed et al**" Role Raman Spectroscopy in Agri. and bio." Progress in electromagnetic radiation **8-11 August 2016 Shanghai China**.
24	**M. Ahmed et al**" Measurements of simultaneously Refrative index & thickness by THz radiation" Progress in electromagnetic radiation" **8-11 August 2016 Shanghai China**.
25	**M. Ahmed** "NOOR 2nd symposium on applied materials and nano-devices" **14-16 Nov. 2016.**
26	**M. Ahmed et al , 41st, 42nd ,43th and 45th International Summer college Islamabad 2016,2017,2018, and 2020.**
27	**M. Ahmed et al, Photonics activities in Pakistan at BELT- ROAD and BRICS FORUM for Advance Phtonics at Zhejiang university china , Dec.12. 2019,**
28	**M. Ahmed etal, "PROGRESS IN TERAHERTZ PHOTONICS IN PAKISTAN" at BELT- ROAD and BRICS Forum for advance photonics at Forum Zhejiang university China , Dec. 12, 2020**

L. Organized Workshops/Conferences/ Symposium 12

#	Description
1	Workshop on "Atomic physics and micro-fabrication" April, 3-5, 2012, PIEAS, Islamabad, Pakistan.
2	School on "Nano-plasmonic" May, 11-15, 2013 NILOP Islamabad, Pakistan
3	38th International Nathia Gali Summer College, Activity II "Laser cooling and trapping of atom and molecule" 24-30 June 2013
4	39th International Nathia Gali Summer College, Activity II "Meta-material and plasmonics " 2014
5	"International workshop on GaN LEDs and Laser Diodes" 5-6 March 2015. NILOP Islamabad
6	40th International Nathia Gali Summer College, Activity I "Meta-material and plasmonics 2015.
7	International symposium on lasers and their applications " 7-9 Dec. 2015
8	41th International Nathia Gali Summer College, Activity II " Laser Plasma Interaction and their applications 17-23 Aug. 2016
9	NOOR 2nd symposium on applied materials and nano-devices, 14-16 Nov. 2016 NILOP Islamabad.
10	NOOR 3rd symposium on applied materials and nano-devices, 14-16 Nov. 2017 NILOP Islamabad
11	3rd International Symposium on Nanomedicine (INS-2017) "Nanotheranostics: The power of Nanomedicines". 21st November 2017.
12	Training workshop on "Nanotheranostics from Bench to Bedsides and Beyond" from 19-26 November 2017 at NILOP.