Farah Diana bt Muhammad

Name: Farah Diana binti Muhammad
Current position: Senior Lecturer, Physics Department, Faculty of Science, Universiti Putra Malaysia
Research ID: M-1239-2015
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OBJECTIVES

- To gain and develop scientific research expertise in Optics and Nanophotonics for career advancement.
- To become a world-class Laser Physicist/Lecturer aiming for internationally pioneering research works.
- To establish international research collaboration with the world renowned centres of excellence and top institutions in the world

RESEARCH INTERESTS/AREAS OF EXPERTISE

- Mode-locked fiber laser
- Q-switched fiber laser
- Saturable absorber
- Nonlinear optics
- Supercontinuum generation
- Radio frequency generation
- Single-longitudinal mode fiber laser

EDUCATIONAL BACKGROUND

2011 – 2014 **Photonics Research Centre, University of Malaya (UM)**
Ph.D. - Experimental Physics (Fiber lasers)
Thesis title: Graphene as saturable absorber for photonics applications
Award: Distinction
Supervisor: Professor Dr. Harith Ahmad

2008 – 2011 **University of Technology, Malaysia (UTM)**
Bachelor Degree of Science (Pure Physics)
CGPA: 3.95 out of 4.00

EMPLOYMENT HISTORY

Since January 2015 **Department of Physics, Universiti Putra Malaysia**
Senior Lecturer

PUBLICATIONS

2020

1. Zulkifli, M. Z., **Muhammad, F. D.**, Mohd Azri, M. F., Mohd Yusof, M. K., Hamdan, K. Z., Samsudin, S. A., & Yasin, M. (2020). Tunable passively Q-switched ultranarrow linewidth erbium-doped fiber laser. *Results in Physics*, *16*, 102949.

2. Zulkifli, M. Z., Yasin, M., Awang, N. A., Lau, K. Y., **Muhammad, F. D.**, & Zamzuri, A. K. (2020). Octave spanning supercontinuum generation with a few-mode fiber. *Laser Physics*, *30* (7), 075104.

3. Muhammad Azri, M. F., Zulkifli, M. Z., **Muhammad, F. D.**, Yusof, M. K., Bahari, M. S., Samsudin, S. A., & Yasin, M. (2020). Color detection using non-target reflectivity plastic optical fiber displacement sensor. *Microwave and Optical Technology Letters*, 1-5.

4. Musa, M. A., Azis, R. S., Dong, X., Osman, N. H., Hassan, J., **Muhammad, F. D.**, & Mokhtar, N. (2020). Influence of aluminum substitution on microstructural, electrical, dielectric, and electromagnetic properties of sol-gel synthesized yttrium iron garnet (YIG). *AIP Advances*, *10*(4), 045128.

5. Tafida, R. A., Halimah, M. K., **Muhammad, F. D.**, Chan, K. T., Onimisi, M. Y., Usman, A., Hamza, A. M., & Umar, S. A. (2020). Structural, optical and elastic properties of silver oxide incorporated zinc tellurite glass system doped with Sm3+ ions. *Materials Chemistry and Physics*. *246*, 122801.

6. Faznny, M. F., Halimah, M. K., Eevon, C., Latif, A. A., **Muhammad, F. D.**, Asyikin, A. S., Nazrin, S. N., & Zaitizila, I. (2020). Comprehensive study on the nonlinear optical properties of lanthanum nanoparticles and lanthanum oxide doped zinc borotellurite glasses. *Optics & Laser Technology*, *127*, 106161.

2019

7. Zulkifli, M. Z., Lau, K. Y., **Muhammad, F. D.**, & Yasin, M. (2019). Dual mode output in half open cavity random fiber laser. *Optics Communications*, *430*, 273-277.

8. Faznny, M. F., Halimah, M. K., Latif, A. A., **Muhammad, F. D.**, & Hasnimulyati, L. (2019). Optical Properties of La3+NPs/Ag+Co-Doped Zinc Borotellurite Glass. *Solid State Phenomena*, *290*, 3-8.

9. Hamza, A. M., Halimah, M. K., **Muhammad, F. D.**, & Chan, K. T. (2019). Physical properties, ligand field and Judd-Ofelt intensity parameters of bio-silicate borotellurite glass system doped with erbium oxide. *Journal of Luminescence*, *207*, 497-506.

10. Nazrin, S. N., Halimah, M. K., & **Muhammad, F. D.** (2019). Comparison study of optical properties on erbium-doped and silver-doped zinc tellurite glass system for non-linear application. *Journal of Materials Science: Materials in Electronics*, *30* (7), 6378-6389.

11. Husin, S. A. S., **Muhammad, F. D.**, Abdullah, C. A. C., Ribut, S. H., Zulkifli, M. Z., & Mahdi, M. A. (2019). Zinc-oxide nanoparticle-based saturable absorber deposited by simple evaporation technique for Q-switched fiber laser. *Chinese Physics B*, *28* (8), 084207.

12. Halimah, M. K., Nazrin, S. N., & **Muhammad, F. D.** (2019). Influence of Silver Oxide on Structural, Physical, Elastic and Optical Properties of Zinc Tellurite Glass System for Optical Application. *Chalcogenide Letters*, *16*, 365 – 385.

13. Hamza, A. M., Halimah, M. K., **Muhammad, F. D.**, Chan, K. T., Usman, A., Faznny, M. F., Zaitizila, I., & Tafida, R. A. (2019). Structural, optical and thermal properties of Er3+-Ag codoped bio-silicate borotellurite glass. *Results in Physics*, *14*, 102457.

14. Hamza, A. M., Halimah, M. K., **Muhammad, F. D.**, Chan, K. T.,Umar, S. A., Umaru, I., & Geidam, I. G. (2019). Effect of erbium nanoparticles on structural and spectroscopic properties of bio-silica borotellurite glasses containing silver oxide. *Materials Chemistry and Physics*, *236*, 121795.

15. Mohammadi, R., Azis, R. S., Zakaria, A., Isa, N. H., Saat, N. K., Mokhtar, N., & **Muhammad, F. D.** (2019). Electrical and Microstructural Properties of Zno-Bi2o3-Tio2-Sb2o3-Al2o3-Based Varistor Ceramics Fabricated By Solution Coating Method. *Digest Journal Of Nanomaterials And Biostructures, 14*, 1105-1113.

16. Zazali, N. A., Latif, A. A., Lau, K. Y., Mahdi, M. A., **Muhammad, F. D.**, Yusoff, Z., Abdul-Rashid, H. A., Radzi, N. M., Tamchek, N., & Abu Bakar, M. H. (2019). 860 femtoseconds mode-locked fiber laser by Gallium co-doped erbium fiber (Ga-EDF). *Results in Physics, 15*, 102644.

2018

17. **Muhammad F. D.**, Zulkifli, M. Z., & Ahmad, H. (2018). 1500-nm Q-switched fibre laser. *Quantum Electronics, 48*, 941-944.

18. Muhamad, A., **Muhammad F. D.**, Ismail, M. F., & Ahmad, H. (2018). All-Fiber Wavelength Switchable Thulium Doped Fiber Lasers Incorporating an Arrayed Waveguide Grating. *Solid State Science and Technology*, *26*, 57-64.

19. Syed Husin, S. A., **Muhammad, F. D.**, Norizan, S. F., Latif, A. A., Awang, N. A., & Zulkifli, M. Z. (2018). Narrow core standard single mode fiber for supercontinuum generation from graphene-based mode-locked pulses. *Optik*, *172*, 347-352.

20. Lau, K. Y., Zainol Abidin, K. H., Abu Bakar, M. H., Latif, A. A., **Muhammad, F. D.**, Huang, N. M., Omar, M. F., & Mahdi, M. A. (2018). Passively mode-locked ultrashort pulse fiber laser incorporating multi-layered graphene nanoplatelets saturable absorber. *Journal of Physics Communications*, 2, 075005.

21. Lau, K. Y., Abu Bakar, M. H., **Muhammad, F. D.**, Latif, A. A., Omar, M. F., Yusoff, Z., & Mahdi, M. A. (2018). Dual-wavelength, mode-locked erbium-doped fiber laser employing a graphene/polymethylmethacrylate saturable absorber. *Optics Express*, *26*, 12790-12800.

22. Usman, A., Halimah, M. K., Latif, A. A, **Muhammad, F. D.**, & Abubakar, A. I. (2018). Influence of Ho3+ ions on structural and optical properties of zinc borotellurite glass system. *Journal of Non-Crystalline Solids*, *483*, 18-25.

23. Halimah, M. K., Ami Hazlin, M. N., & **Muhammad, F. D.** (2018). Experimental and theoretical approach on the optical properties of zinc borotellurite glass doped with dysprosium oxide. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, *195*, 128-135.

24. Ami Hazlin, M. N., Halimah, M. K., & **Muhammad F. D.** (2018). Absorption and emission analysis of zinc borotellurite glass doped with dysprosium oxide nanoparticles for generation of white light. *Journal of Luminescence*, *196*, 498-503.

25. Zaitizila, I., Halimah, M. K., **Muhammad, F. D.**, & Nurisya, M. S. (2018). Influence of manganese doping on elastic and structural properties of silica borotellurite glass. *Journal of Non-Crystalline Solids*, *492*, 50-55.

26. Nazrin, S. N., Halimah, M. K., **Muhammad, F. D.**, Yip, J. S., Hasnimulyati, L., Faznny, M. F., Hazlin, M. A., & Zaitizila, I. (2018). The effect of erbium oxide in physical and structural properties of zinc tellurite glass system. *Journal of Non-Crystalline Solids*, *490*, 35-43.

27. Zaitizila, I., Halimah, M. K., **Muhammad, F. D.**, & Faznny, M. F. (2018). Thermal Stability and Effect of Heat Treatment on Manganese Doped Silica Borotellurite Glass. *Journal of Materials Science and Chemical Engineering*, 6, 24.

28. Fudzi, F. M., Kamari, M. H., **Muhammad, F. D.**, Latif, A. A., & Ismail, Z. (2018). Structural and Optical Properties of Zinc Borotellurite Glass Co-Doped with Lanthanum and Silver Oxide. *Journal of Materials Science and Chemical Engineering*, 6, 18.

29. Zaitizila, I., Halimah, M. K., **Muhammad, F. D.**, Nurisya, M. S., & Zaid, M. H. M. (2018). Thermal Stability, Structural and Optical Properties of Rice Husk Sillica Borotellurite Glasses Containing MnO2. *Chalcogenide Letters*, *15*, 187-197.

2017

30. Lau, K. Y., **Muhammad, F. D.**, Latif, A. A., Abu Bakar, M. H., Yusoff, Z., & Mahdi, M. A. (2017). Passively mode-locked soliton femtosecond pulses employing graphene saturable absorber. *Optics & Laser Technology*, *94*, 221-227.

31. Lau, K. Y., Latif, A. A., Abu Bakar, M. H., **Muhammad, F. D.**, Omar, M. F., & Mahdi, M. A. (2017). Mechanically deposited tungsten disulfide saturable absorber for low-threshold Q-switched erbium-doped fiber laser. *Appl. Phys. B*, *123*, 221.

32. Ami Hazlin, M. N., Halimah, M. K., **Muhammad F. D.**, & Faznny, M.F. (2017). Optical properties of zinc borotellurite glass doped with trivalent dysprosium ion. *Physica B: Condensed Matter*. *510*, 38-42.

33. Zaitizila, I., Halimah, M. K., **Muhammad, F. D.**, & Nurisya, M. S. (2017). Optical Properties of Silica Borotellurite Glass Doped with Manganese Oxide. *Solid State Phenomena*, *268*, 18-22.

34. Ami Hazlin, M. N., Halimah, M. K., **Muhammad F. D.**, Faznny, M. F., & Iskandar, S. M. (2017). Effect of Dysprosium Nanoparticles on the Optical Properties of Zinc Borotellurite Glass Systems. *Solid State Phenomena*, *268*, 13-17.

35. Latif, A. A., Awang, N. A., Zazali, N. A., **Muhammad, F. D.**, Halimah, M. K., & Abu Bakar, M. H. (2017). Passively Mode-Locked Fiber Laser by Utilizing TTG film on a D-Shaped Fiber as a Saturable Absorber. *Journal of Science and Technology*, *9*(2).

2016

36. Latif, A. A., Mohamad, H., Abu Bakar, M. H., **Muhammad, F. D.**, & Mahdi, M. A. (2016). Carbon nanotube-based mode-locked wavelength-switchable fiber laser via net gain cross section alteration. Laser Physics, 26(2), 025106

37. **Muhammad, F. D.**, Zulkifli, M. Z., & Ahmad, H. (2016). Multiwavelength Brillouin Fiber Laser with Measurable Linewidth and Signal-To-Noise Ratio Using 0.16 pm Resolution Optical Spectrum Analyzer. *Journal of Solid State Science & Technology*, *24*, 1-11.

2015

38. Razak, N. F., Ahmad, H., Zulkifli, M. Z., **Muhammad, F. D.**, Munajat, Y., & Harun, S. W. (2015). Single mode EDF fiber laser using an ultra-narrow bandwidth tunable optical filter. *Optik, 126*, 179-183.

2014

39. Ahmad, H., **Muhammad, F. D.**, Pua, C. H., & Thambiratnam, K. (2014). Dual-wavelength fiber lasers for the optical generation of microwave and terahertz radiation. *IEEE Journal of Selected Topics in Quantum Electronics*, *20*(5), 1-8.

40. Thambiratnam, K., Ahmad, H., **Muhammad, F. D.**, Zulkifli, M. Z., Zulkifli, A. Z., Paul, M., & Harun, S. W. (2014). Q-switching and mode-locking in highly-doped Zr_2O_3-Al_2O_3-Er_2O_3 doped fiber lasers using graphene as a saturable absorber. *IEEE Journal of Selected Topics in Quantum Electronics*, *20*(1), 1100108

41. Ahmad, H., Azhari, N. S., Zulkifli, M. Z., **Muhammad, F. D.**, & Harun, S. W. (2014). S-band SLM distributed Bragg reflector fiber laser. *Laser Physics, 20*(6), 065109.

42. Ahmad, H., Hamdan, K. Z., **Muhammad, F. D.**, Harun, S. W., & Zulkifli, M. Z. (2014). Switchable dual-wavelength CNT-based Q-switched using arrayed waveguide gratings (AWG). *Applied Physics B*.

43. Ahmad, H., Razak, N. F., Zulkifli, M., **Muhammad, F. D.**, Munajat, Y., & Harun, S. W. (2014). Closely-spaced dual-wavelength fiber laser using ultra-narrow bandwidth optical filter for low radio frequency generation. *Applied Optics*, *53*(19), 4123-4127.

44. Ahmad, H., Ismail, M. F., Hassan, S. N. M., **Muhammad, F. D.**, Zulkifli, M. Z., & Harun, S. W. (2014). Supercontinuum generation from a sub-megahertz repetition rate femtosecond pulses based on nonlinear polarization rotation technique. *Journal of Modern Optics*.

45. Harun, S. W., Ahmad, F., Md Nor, R., Zulkepely, N. R., **Muhammad, F. D.**, Ahmad, H., & Arof, H. (2014). Mode-locked soliton erbium-doped fiber laser using a single-walled carbon nanotubes embedded in poly-ethylene oxide thin film saturable absorber. *Journal of Modern Optics*, *61*(6), 541-545.

46. Ahmad, H., **Muhammad, F. D.**, Zulkifli, M. Z., & Harun, S. W. (2014). Wideband tunable Q-switched fiber laser using graphene as a saturable absorber. *Journal of Modern Optics*, *60*(18), 1563-1568.

47. **Muhammad, F. D.**, Zulkifli, M. Z., & Ahmad, H. (2014). Graphene based Q-switched tunable S-band fiber laser incorporating arrayed waveguide gratings (AWG). *Journal of Nonlinear Optical Physics & Materials*, *23*(1), 1450004.

2013

48. Ahmad, H., Zulkifli, M. Z., **Muhammad, F. D.**, Samangun, J. M., Abdul-Rashid, H. A., & Harun, S. W. (2013). Temperature-insensitive bend sensor using entirely centered erbium doping in the fiber core. *Sensors*, *13*(7), 9536-9546.

49. Ahmad, H., **Muhammad, F. D.**, Zulkifli, M. Z., & Harun, S. (2013). Graphene-based mode-locked, spectrum tunable fiber laser using Mach Zehnder filter. *IEEE Photonics Journal*, *5*(5), 1501709

50. Ahmad, H., Razak, N. F., Zulkifli, M. Z., **Muhammad, F. D.**, Munajat, Y., & Harun, S. W. (2013). Ultra-narrow linewidth single longitudinal mode Brillouin fiber ring laser using highly nonlinear fiber. *Laser Physics Letters*, *10*(10), 105105.

51. Zulkifli, M. Z., Ahmad, H., Taib, J. M., **Muhammad, F. D.**, Dimyati, K., & Harun, S. W. (2013). S-band multiwavelength Brillouin/Raman distributed Bragg reflector fiber lasers. *Applied Optics*, *52*(16), 3753-3756.

52. Ahmad, H., Zulkifli, A. Z., **Muhammad, F. D.**, Zulkifli, M. Z., Thambiratnam, K., & Harun, S. W. (2013). Mode-locked L-band bismuth–erbium fiber laser using carbon nanotubes. *Applied Physics B*, 1-6.

53. Ahmad, H., Zulkifli, M. Z., **Muhammad, F. D.**, Zulkifli, A. Z., & Harun, S. W. (2013). Tunable graphene-based Q-switched erbium-doped fiber laser using fiber Bragg grating. *Journal of Modern Optics*, *60*(3), 202-212.

54. Ahmad, H., **Muhammad, F. D.**, Zulkifli, M. Z., & Harun, S. W. (2013). Q-switched pulse generation from an all-fiber distributed Bragg reflector laser using graphene as saturable absorber. *Chinese Optics Letters*, *11*(7), 071401.

55. Ahmad, H., Zulkifli, M. Z., **Muhammad, F. D.**, Taib, J. M., & Harun, S. W. (2013). Tunable S-band output based on Raman shift in dispersion shifted fiber. *Journal of Modern Optics*, *60*(9), 737-740.

56. Ahmad, H., Zulkifli, M. Z., Hassan, N. A., **Muhammad, F. D.**, & Harun, S. W. (2013). S–C–L triple wavelength superluminescent source based on an ultra-wideband SOA and FBGs. *Quantum Electronics*, *43*(10), 923-926.

2012

57. **Muhammad, F. D.**, Zulkifli, M. Z., Harun, S. W., & Ahmad, H. (2013, May). High resolution interrogation system for fiber Bragg grating (FBG) sensor application using radio frequency spectrum analyser. In *2012 National Physics Conference: (PERFIK 2012)* (Vol. 1528, No. 1, pp. 444-449). AIP Publishing

58. **Muhammad, F. D.**, Zulkifli, M. Z., Latif, A. A., Harun, S. W., & Ahmad, H. (2012). Graphene-based saturable absorber for single-longitudinal-mode operation of highly doped erbium-doped fiber laser. *IEEE Photonics Journal, 4*(2), 467-475.

59. Ahmad, H., **Muhammad, F. D.**, Zulkifli, M. Z., Latif, A. A., & Harun, S. W. (2012). Tunable radio frequency generation using a graphene-based single longitudinal mode fiber laser. *Journal of Lightwave Technology*, *30*(13), 2097-2102.

60. Ahmad, H., **Muhammad, F. D.**, Zulkifli, M. Z., & Harun, S. W. (2012). Graphene-oxide-based saturable absorber for all-fiber Q-switching with a simple optical deposition technique. *IEEE Photonics Journal, 4*(6), 2205-2213.

61. Ahmad, H., Zulkifli, M. Z., **Muhammad, F. D.**, Jemangin, M. H., Dimyati, K., Pal, B. P., & Harun, S. W. (2012). Passively Q-Switched 11-channel stable Brillouin erbium-doped fiber laser with graphene as the saturable absorber. *IEEE Photonics Journal*, *4*(5), 2050-2056.

INTERNATIONAL PROGRAM

1. The 66th Lindau Nobel Laureate Meeting, Lindau, Germany, 26 June to 1 July 2016
2. Winter College on Optics; Light: a Bridge between Earth and Space, International Centre for Theoretical Physics (ICTP), Trieste, Italy, 9-20 February 2015.
3. Preparatory school: Light: a Bridge between Earth and Space, ICTP, Trieste, Italy, 2-6 February 2015.
4. Siegman International School on Lasers, Stanford University, Stanford, California, USA, 3-8 August 2014

PRINCIPLE INVESTIGATOR OF RESEARCH GRANTS

September 2019 – August 2021	**RM 100 000,** High-energy pulsed 1700 nm Raman fiber laser based on carbon quantum dots saturable absorber for mid-infrared supercontinuum generation, Fundamental Research Grant Scheme (FRGS) - Ministry of Higher Education (MoHE), Malaysia
August 2016 - August 2018	**RM 70 000**, Supercontinuum generation in mid-infrared region from a femtosecond pulses using saturable absorber-based thulium-doped fiber laser for high-resolution spectroscopy, FRGS - Ministry of Higher Education, Malaysia
June 2016 - Jun 2017	**RM 50 000**, Passively Mode-Locked Thulium doped Fiber Laser based on Saturable Absorber. Internal Research Grant of Universiti Putra Malaysia (GP-IPM)

CO-RESEARCHER OF RESEARCH GRANTS

August 2017 - August 2019	**RM 73 200**, Fundamental Study on Nonlinear Saturable Absorption and Optical Amplification of Graphene-Erbium Monolithic Device for Ultrashort Pulse Generation, FRGS - Ministry of Higher Education, Malaysia
August 2017 - August 2019	**RM 85 500**, Femtosecond Fiber Laser Utilizing Graphene-based Saturable Absorber, Prototype Development Research Grant Scheme Scheme - Ministry of Higher Education, Malaysia
January 2019 – Dec. 2021	**RM 98 520**, Octave-spanning light generation from 300 nm to 2300 nm using hybrid design of highly nonlinear specialty fibers, FRGS - Ministry of Higher Education, Malaysia
January 2019 – Dec. 2020	**RM 84 000**, Elastic, linear and nonlinear optical properties of zinc borotellurite doped with erbium oxide and silica derived from waste rice husk. FRGS - Ministry of Higher Education, Malaysia
September 2019 – August 2022	**RM 146 300**, Sensitivity Enhancement of Surface Plasmon Resonance Using Modified Nanocrystalline Cellulose for Potential Detection of Environmental Pollutants. FRGS - Ministry of Higher Education, Malaysia

SUPERVISION OF GRADUATE STUDENTS

Program	Status	As a Chairman (Main Supervisor)	As a Member (Co-supervisor)
PhD	Graduated	-	6
	Ongoing	-	4
Masters (with thesis)	Graduated	1	2
	Ongoing	-	2

SUPERVISION OF UNDERGRADUATE STUDENTS (FINAL YEAR PROJECT)

Status	As a Chairman (Main Supervisor)
Graduated	12
Ongoing	2

TEACHING ACTIVITIES

Semester 2, Session 2014/2015 Semester 2, Session 2016/2017 Semester 2, Session 2017/2018	**Modern Optics**
Semester 2, Session 2015/2016 Semester 1, Session 2019/2020 Semester 1, Session 2020/2021	**Photonics and Optoelectronics**
Semester 1, Session 2016/2017 Semester 1, Session 2017/2018 Semester 2, Session 2019/2020	**Geometrical Optics**
Semester 1, Session 2016/2017 Semester 2, Session 2016/2017 Semester 1, Session 2017/2018 Semester 2, Session 2017/2018 Semester 1, Session 2018/2019 Semester 1, Session 2019/2020 Semester 1, Session 2020/2021	**Computational Physics**
Semester 1, Session 2018/2019 Semester 2, Session 2018/2019	**Physics 1**
Semester 2, Session 2019/2020	**Advanced Practical**

REFERENCES

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