MUHAMMAD SHIRAZ AHMAD

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EDUCATION

Lahore University of Management Sciences, Lahore, Pakistan
Master of Science (MS), Physics — Sep 2017 – Jun 2019

Bahauddin Zakariya University, Multan, Pakistan
Bachelor of Science (BS), Physics — Oct 2013 – Jun 2017

PROFESSIONAL EXPERIENCE

Teaching and Supervision

National University of Computer and Emerging Sciences, Lahore, Pakistan
External Instructor

- NL 110 – Physics for Engineers Lab (Three Sections) — Fall 2020
- EE 117 – Applied Physics (Two Sections) — Fall 2019

Lahore University of Management Sciences (LUMS), Lahore, Pakistan
Teaching Assistant

- PHY 505 – Computational Physics (Volunteer) — Spring 2020
- PHY 200 – Experimental Physics Lab I (Twice) — Fall 2019, Spring 2020
- PHY 104 – Modern Physics (Twice) — Spring 2018, Spring 2019

Supervision of Research Internee in Graduate Physics Lab — Jul 2019 – Aug 2019

- Project: Experimental Analysis of Superconductivity and Quantum Interference
  - I supervised a student on doing series of experiments on Superconducting Quantum Interference Device.

Research and Development

Lahore University of Management Sciences (LUMS), Lahore, Pakistan
Research Assistant

- Testing and Documentation of Homemade Electrospinning Deposition System — July 2020 – Sep 2020
  - I tested the prototype developed by PhysLab Team, wrote technical manuals, and synthesized nano fibers of thickness 100 nm.
- Contribution in Development of an in–house Low Field NMR — Dec 2019 – Jan 2020
  - I wrote the Arduino code to implement and control high-speed switching of the circuit.
- Designing Undergraduate Physics Laboratory Experiments in Technology Transfer Project — Jun 2019 – Jul 2019
  - I designed two experiments, which are enlisted in projects section.

Qosain Scientific and PhysLab, Lahore, Pakistan
Research Physicist — Jun 2019 – Aug 2019

- I developed a python–based graphing and curve fitting software: PhysPlot (https://www.physlab.org/physplot/).
- Major Libraries Used: NumPy, SciPy, Matplotlib, Pandas, PyQt5.

ACADEMIC PROJECTS

Physlock – An Entry Level Lock–in Amplifier Board (Homemade) — Spring 2018
- I did testing of first prototype Lock–in amplifier circut board, and tested its functionality by verifying Malus's law.
- I helped developing the final product which is now available at: qosain.pk.

Reflection and Transmission of Light from Multilayer Films — Fall 2018
- I designed a Matlab algorithm to find Fresnel coefficients of multilayered thin films and verified the simulated results with the experiments performed in *Bio-Agri-Photonics Lab, LUMS*.
- Major Components Used: 1547 nm LASER, Waveguide, Manual Fiber Polarization Controllers and Polarimeter.

Orbital Angular Momentum Generation and Detection — Spring 2017
- I studied the basics of orbital angular momentum (OAM), multiplexing of OAM modes into a single beam, and demultiplexing them to recover all modes again.
- Also simulated OAM modes using Wolfram Mathematica.

Measurement of Verdet Constant by Faraday Rotation — Fall 2017

– In this collaborative project, we designed an experimental setup to measure the Verdet Constant and measured it for air, sugar solution, isopropanol, and water.

Synthesis of High Tc Superconductor using Citrate Pyrolysis and Observing the Meissner Effect. Fall 2017
– The main objective was to prepare the high critical temperature (Tc) $YBa_2Cu_3O_7$ superconductor, as it is among those materials have Tc near to the boiling point of liquid nitrogen. A chemically derived citrate pyrolysis technique was used for this purpose. The superconducting state was verified using Meissners effect.

Mach–Zehnder Interferometry and Erasure of 'Which-path' Information. Fall 2017
– We verified erasure and recovery of which–path information inside a Mach–Zehnder interferometer. We obtained results for Variation of intensity pattern with the post-interferometer polarizer and Variation of optical intensity with the relative angle between the polarizers placed inside the arms of the interferometer.

Gated RF Pulses
– I integrated Software Defined Radio (USRP) with Python, and wrote a script to generate gated RF pulses to use it with an NMR developed by the Physlab team.

Zeeman Effect Spring 2018
– I observed the Zeeman effect of Neon Gas by placing a neon lamp under a strong magnetic field and then observing its spectrum on a spectrum analyzer.

A simple Arduino Based Oscilloscope for Physlab Spring 2018
– I built a low cost, 4–channel oscilloscope with Arduino and open source codes.

Experiments with a linear air track (https://physlab.org/experiment/experiments-with-a-linear-air-track/)
– I designed a series of experiments using linear airtrack which are currently an integral part of LUMS Undergraduate laboratory curriculum.
– Designed a Matlab macro and Python GUI software that takes the sensors data and automates the analysis.

Newton's cradle (https://physlab.org/experiment/newtons-cradle/)
– I designed this smart physics experiment which is currently an integral part of LUMS Undergraduate laboratory curriculum.
– Wrote Matlab script to explore transfer of energy and energy losses.

ONLINE COURSES – PROGRAMMING

Django Features and Libraries January 2021
University of Michigan, Credential ID: ZYTLKA5N93Y2

Building Web Applications in Django January 2021
University of Michigan, Credential ID: DK5W5KN66L6R

Web Application Technologies and Django January 2021
University of Michigan, Credential ID: BD38RPWP4BRA

AI For Everyone July 1, 2020
deeplearning.ai, Credential ID: KNDV56JCLVNA

Python and Django Full Stack Web Developer Bootcamp March 25, 2020
Jose Portilla, Pierian Data Inc., Credential ID: UC-e6527304-b62b-4dbf-9a71-2d80a9ac013b

Using Databases with Python March 09, 2020
University of Michiga, Credential ID: BTE4CU64GBZ4

Managing Big Data with MySQL February 29, 2020
Duke University, Credential ID: V8RDYPM9X8N2

Introduction to Data Science in Python February 22, 2020
University of Michiga, Credential ID: CTYUQCC7C23S

ADDITIONAL EXPERIENCE

Question Bank - Automation (http://generatepaper.online/), Lahore, Pakistan
Co–founder & Developer Jan 2020 – Present
– I developed a problem set generation system (a dynamic website), fully compatible with LaTeX, to help instructors manage their own database, and generate print–ready problem sets for students.
– Languages Used: Django Web Framework, MySQL, LaTeX & Python.

COMMUNITY SERVICE / VOLUNTEERING

Khwarizmi Science Society, Lahore, Pakistan

Mentor (Lahore Science Fair 2019) Oct 12, 2019
Science Demonstrator (15th DAWN Education Expo 2018) Feb 07,2018
Science Demonstrator (Lahore Science Fair 2018) Jan 27, 2018

Bahauddin Zakariya University, Multan, Pakistan
Class Representative (BS, Semester 5) 2015

CORE SKILLS

Software: Matlab, Maplesoft, Mathematica, NI Multisim, Adobe Illustrator, Microsoft Visio.
Programming languages: Python (PyQt5, Django, Pandas, Selenium, e.t.c.), C++, MySQL/SQLite, LaTeX.
Hardware prototyping: Vector Network Analyzer (Pico VNA), NI DAQ, Software-defined radio, Arduino, Lock–in Amplifier.

SCIENTIFIC REPORTS (SELECTED)

Masters Thesis

- **Ahmad, M.S.** and A.Z. Chaudhry (May 2019). *Solutions for bosonic dissipative quadratic open systems.*

Academic Projects (Selected)

- **Ahmad, M.S.** and M.S. Anwar (Feb 2019a). *Arduino based oscilloscope for Physlab (physlab.org).*
- **Ahmad, M.S.**, M. Shafique, and M.S. Anwar (Apr 2019). *Physlock: An Entry–Level Low–Cost Lock–In Amplifier Board (physlab.org).*
- Sohail, E., **Ahmad, M.S.**, and M.S. Anwar (Jul 2019). *Experimental Analysis of Superconductivity and Quantum Interference. (physlab.org).*
- **Ahmad, M.S.** (2018a). *Orbital Angular Momentum Generation and Detection (researchgate.net).*
- **Ahmad, M.S.** (2018b). *Reflection and Transmission of Light from Multilayered Films: An easy approach, using MATLAB (physlab.org).*
- Arshad, M.J., **Ahmad, M.S.**, and R. Abbas (2017). *Measurement of Verdet Constant by Faraday Rotation. (researchgate.net).*

LAB Manuals

- **Ahmad, M.S.** and Anwar, M.S. (May 2019). *Newton's cradle observed by video tracking (physlab.org).*
- **Ahmad, M.S.** and Anwar, M.S. (May 2019). *Experiments with a linear air track (physlab.org).*
- **Ahmad, M.S.**, Hussain, A., Salman,R., and M.S. Anwar (Jul 2019). *Tuning a Laser Diode (physlab.org).*
- Hassan, M.U., **Ahmad, M.S.**, and M.S. Anwar (Apr 2019). *PhysLogger – Quick start Guide (App) (physlab.org).*

August 3, 2021

Muhammad Shiraz Ahmad,
Lahore, Pakistan.