



Sulman Younas

Date of birth: 07/08/1993 | **Nationality:** Pakistani | **Gender:** Male | **Phone number:** (+40) 755607521 (Mobile) |

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Address: IFIN-HH Doctoral Dormitory, , Street Atomistilor 242, 077125, Magurele, Romania (Home)

● WORK EXPERIENCE

17/12/2020 – CURRENT Magurele, Romania

RESEARCH ASSISTANT HORIA HULUBEI NATIONAL INSTITUTE OF PHYSICS AND NUCLEAR ENGINEERING (IFIN-HH)

My task was based on maintenance and development of the electron reconstruction efficiency measurement software and methods in ATLAS EGamma CP group. I have been working for Run 3 data validation under this group. Currently I am working on the Full Run2 Charged Higgs Analysis under ATLAS HDBS/BSM group.

10/01/2019 – 27/12/2019 Islamabad, Pakistan

RESEARCH INTERNSHIP EXPERIMENTAL HIGH ENERGY PHYSICS, NATIONAL CENTER FOR PHYSICS QUAID AZAM UNIVERSITY CAMPUS

Projects During Internship:

1. Study of Multivariate Techniques.
2. Python, Gitlab & CERN Root
3. Working with Boosted Decision Trees.
4. Data and MC comparison.

Address Shahdra Valley Road, Islamabad, Pakistan | **Website** www.ncp.edu.pk

● EDUCATION AND TRAINING

01/10/2020 – CURRENT Bucharest, Romania

DOCTORAL OF PHILISOPHY IN PHYSICS The University of Bucharest

Address Elementary Particle Physics, Atomistilor 45, 077125, Bucharest, Romania |

Thesis Search for HBSM double charged scalar bosons in multi-leptons final states using proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector

13/09/2017 – 15/12/2019 Lahore, Pakistan

MASTER OF PHILOSOPHY (M.PHIL) PHYSICS Lahore Garrison University

Major subjects

Nano-particles and their Synthesis, Nonlinear Physics, Electrodynamics, Mathematical Methods,

Thesis title " Data vs Monte Carlo and separation of signal and backgrounds of multi-leptonic analysis using BDT at CMS Experiment"

Medium of Instructions and examination: English

National classification 18 years of Education

10/09/2015 – 02/06/2017 Lahore, Pakistan

MASTER OF SCIENCE (M.SC) PHYSICS University of Lahore

Specialized in Pure Physics

Main Subjects: Classical Mechanics, Quantum Mechanics, Electronics, Mathematical Methods, Electromagnetic Theory, Computational Physics, Applied Nuclear and Particle Physics, Atomic and Molecular Physics, Thermal and Statistical Physics, Lasers
Medium of Instructions and Examination: English

National classification 16 years of Education

04/10/2012 – 20/08/2014 Lahore, Pakistan

BACHELOR OF SCIENCE (B.SC) University Of Punjab

Major Subjects: Physics, Chemistry, Mathematics

Medium of Instructions and Examination: English

National classification 14 years of Education

● LANGUAGE SKILLS

Mother tongue(s): **URDU**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	B2	C1	B2	B2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

● ADDITIONAL INFORMATION

PUBLICATIONS

[Methodology of electron reconstruction efficiency in situ calibration at high-energy colliders and accuracy of the associated statistical uncertainties](#)

– 2023

The electron reconstruction efficiency in modern hadron collider experiments is often calibrated using known sources of electrons in the observed data, such as electroweak decays of short-lived particles. We recall the practical details of the tag-and-probe method used to perform such measurements in an unbiased way. We study the accuracy of the approximation used to estimate statistical uncertainties in published results of the ATLAS experiment. We conclude that the approximation is justified.

SULMAN YOUNAS, Rom. J. Phys. 68, 403 (2023)

[Electron and photon efficiencies in LHC Run 2 with the ATLAS experiment](#) – 2021

Target journal: **JHEP**

Results of electron reconstruction, identification, and isolation efficiency and photon identification efficiency precision measurements are presented. They use the full Run 2 dataset with a luminosity of 139 fb^{-1} collected by the ATLAS experiment during the years 2015–2018. The measured electron identification efficiencies have uncertainties that are around 30–50% smaller than the previous Run-2 results due to an improved methodology and the inclusion of more data. A better pileup subtraction method leads to electron isolation efficiencies that are more independent of the amount of pileup activity. Updated photon identification efficiencies are also presented, using full Run 2 dataset. When compared to the previous measurement, a 30-40% smaller uncertainty is observed on the photon identification efficiency ratio, thanks to the increased amount of available data.

ANA-EGAM-2021-01

Link <https://cds.cern.ch/record/2798075/files/ATL-COM-PHYS-2021-1066.pdf>

[Electron reconstruction efficiency measurements using full Run2 data](#) – 2022

This note describes the measurements of electron reconstruction efficiency and scale factors (SF) using TagandProbeFrame (old) framework developed in Run2 for release 21 (Rel21) and the work done to implement the package to measure reconstruction efficiency and SF in TagAndProbe (new) framework developed for release 22 (Rel22). The electron reconstruction scale factors are derived for fast simulation

(AF2) in Rel21 with TagandProbeFrame software and full simulation with the TagAndProbe framework in Rel22. The results are produced using Run2 release 21 data in old and new framework.

ATL-COM-PHYS-2022-478

Link <https://cds.cern.ch/record/2811957/files/ATL-COM-PHYS-2022-478.pdf>

CONFERENCES AND SEMINARS

Conferences

1. 8th School on LHC Physics by CERN & ICTP held on 19-30 August 2019 held at National Center for Physics, Islamabad, Pakistan
2. Poster at 51th International Symposium on Multi particle Dynamics (ISMD 2022)
3. Oral Presentation to IBWAP 2023

Link <https://cds.cern.ch/record/2816354/>

11/07/2023 – 14/07/2023 – Constanta Romania

21st International Balkan Workshop on Applied Physics and Materials Science (IBWAP 2023)

Title: PERFORMANCES OF ELECTRON RECONSTRUCTION + IDENTIFICATION IN RUN 2 AND RUN 3 OF THE ATLAS EXPERIMENT

Link <https://ibwap.ro/wp-content/uploads/2023/06/Accepted-Abstracts-IBWAP-2023.pdf>

31/07/2022 – 05/08/2022 – Scottish Highlands, Scotland

51th International Symposium on Multiparticle Dynamics (ISMD 2022) Title: Performances of electron reconstruction + identification in Run 2 and preparation for Run 3

Link <https://indico.cern.ch/event/1015549/contributions/4932065/>

RECOMMENDATIONS

Dr. Calin Alexa Research Scientist at IFIN-HH

PhD Advisor

Department of Elementary Particle Physics
IFIN-HH, No. 30, Reactorului Street,
Magurele, Ilfov, ROMANIA (077125)

Email Calin.Alexa@cern.ch | Phone (+40) 724464744

HONOURS AND AWARDS

Honours and awards School Topper at SSC level.

Scholarship Awarded by PEEF " Punjab Educational Endowment Funds"

Full Funding Offered by ISMD 2022

ORGANISATIONAL SKILLS

Organisational skills Can Work in Challenging Atmosphere.

Active, Punctual, Responsible, Disciplined and Good Team Mate

COMMUNICATION AND INTERPERSONAL SKILLS

Communication and interpersonal skills My teaching experience polished my communication skills in best way by interaction with different mind set of students. In colleges the medium of instructions was English that also polished my English speaking skills.

I also have attended international workshops and conferences organized by ICTP at National Center for Physics Islamabad, and ISMD2022 at University of Glasgow. so I also have good experience of interaction with people of different scientific societies and cultures.

JOB-RELATED SKILLS

Job-related skills

Having good command on subject and expertise in handling workload.

TECHNICAL SKILLS

Technical Skills

During research work I frequently used number of TMVA techniques for good separation between signal and background at CMS:

1. Fisher Discriminant Analysis
2. Monte Carlo Sampling
3. Projective Likelihood
4. Boosted and Bagged Decision Trees

During my research work I used numbers of software and OS for data analysis & thesis compilation of different techniques

1. C++, Python, ROOT
2. Gitlab
3. LINUX , Fedora & Ubuntu
4. Latex, Endnote for bibliography and citation
5. Excellent command on Microsoft Word, PowerPoint, and Excel

PHD THESIS SUMMARY

résumé

This thesis presents an overview of the Standard Model and physics beyond standard model i.e. Higgs physics within chapter 2. An introduction to the CERN's experiments in general and ATLAS experiment in particular is given in chapter 3. The details about object reconstruction at ATLAS experiment are given in chapter 4. The chapter 5 and 6 contain my contribution towards different measurements and performances towards ATLAS physics analyses. The major work about electron reconstruction efficiency measurements and singly and doubly charged Higgs searches at ATLAS experiment is done under groups i.e. Electron and Photon Performance Group (EGAMMA) and Higgs and Diboson Searches (HDBS).

The first part of the chapter 5 describes the measurement methodology used by the ATLAS experiment to perform the efficiency measurement for the reconstruction algorithm. I have briefly described the tag-and-probe method that permits to select an unbiased sample of electrons in data, and estimation of the residual background contributions for the efficiency measurement. The section is also dedicated to measure statistical uncertainties through pseudo-experiments. Since statistical uncertainties in published results are estimated using first-order approximations only, there are detailed results are provided to the accuracy of those approximations by comparing them to the dispersion of repeated pseudo-experiments.

The scale factors measurement for AF2 samples in release 21 with release 21 framework and the results are shown. The re-implementation of methodology for electron reconstruction efficiency in release 22 framework and the proof of correctness of that work and comparison of scale factors in either versions of frameworks i.e. Rel21 & Rel22 is provided.

Aiming at signal searches to extend the scalar sector of the Standard Model with a scalar triplet, directing to a phenomenology which comprehends singly and doubly charged Higgs bosons, the analysis is presented in chapter 6. The associated production of doubly charged and singly charged Higgs bosons are investigated through the analysis. The topologies used for the analysis and the details of theoretical framework is also entailed. The Monte Carlo simulations used for various selection variables are documented and the signal regions used for the different mass hypotheses of charged Higgs are described in order to distinguish signatures of BSM processes from SM backgrounds. The results obtained for the background validation and the MC signal are concluded as well.
