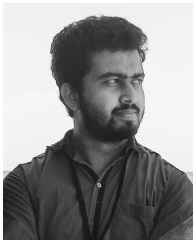

Prachurjya Pran Hazarika

Research Scholar in Experimental High Energy Physics
under the guidance of Dr. Sourabh Dube
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Research Work

Analysis

2020-Present (ongoing)

"Search for VLL Singlet in CMS experiment"
I am developing the analysis tools to search for the singlet 'vector-like leptons' in the final state containing two muons with the same sign. The data sample I am working with corresponds to an integrated luminosity of 59.7 fb^1 of proton-proton collisions at a center-of-mass energy of 13 TeV collected by the CMS experiment at the LHC in 2018. I plan to extend this search for the two electron same-sign final state and data corresponding to entire run 2 (137 fb^{-1}, collected in 2016-18).

Service work for CMS

2023-Present (Ongoing)

"Validation of the DNN electron ID"
A DNN based electron ID has been designed for identification of electrons in Run3 and is integrated in the CMSSW_13+ framework. It is a multi-classifier targeted to to distinguish isolated as well as non-isolated electrons from fakes coming from different sources. I am investigating the performance of each node of the DNN against the already existing MVA scores. I am also planning to check what fraction of electron candidates which pass the DNN ID end up getting selected as analysis electrons. Once we can choose suitable working points with these DNN nodes, we hope it would replace the existing cut-based PFID for electrons.

2023-Present (Ongoing)

"MC contact position in the EGamma group"
Every Physics Object Group (POG) in CMS requires an MC contact person whose job is to act as link between the generator group and the corresponding POG. I became the MC contact for the EGamma group in May 2023. My tasks include cloning of MC requests from previous ones (if they exist), or prepare new requests starting with gridpacks.

2021

"Photon Particle Flow ID Development for Run3"
The Particle Flow algorithm is used in CMS to correlate between the basic elements from all the detector layers to reconstruct and identify each final state particle. These final state particles are given a Particle Flow ID. The PFID for photons is defined using some selections on the photon reconstruction variables. I developed a neural network based ID which can replace the cut-based photon PFID. This is ID ends up giving better efficiency for photons than the current cut-based ID, and is implemented in CMSSW_12+ framework.

Master's Thesis

2018-2019

"A Study on the Potential of Detection of NSI in Neutrino-Oscillation Experiments"
A phenomenological study on the Non-Standard Interactions (NSI) in neutrinos and the consequences of NSI on neutrino oscillations and neutrino detection experiments, by taking Super-Kamiokande as an example. (Thesis submitted in partial fulfillment for the Masters Degree.)

Education

Present	**PhD in Physics**, IISER-Pune, Maharashtra, India, 411008 Member of the CMS Collaboration. Currently in 7th semester
2017-2019	**MSc in Physics**, Tezpur University, Assam, India, 784028 First Class, First Rank Holder (Gold Medalist) with CGPA 8.92
2014-2017	**BSc in Physics**, Jorhat Institute of Science and Technology, Jorhat Affiliated to Dibrugarh University, Assam, India, 786004 First Class, Second Rank with percentage 90.64

Collaborations

2020-Present	**CMS Collaboration**, at the Large Hadron Collider, CERN, Geneva

Talks and Conferences

May, 2023	**HSF-India Software Training Event**, at TIFR, Mumbai The High Energy Physics Software Foundation along with TIFR Mumbai organized a workshop for software training from 1st to 5th May, 2023. The workshop covered basic C++, scientific python, GPU programming, basics of machine learning using tensorflow and JAX.
January, 2022	**India-CMS meeting**, held online I presented my work on the Photon ID development, which was part of the service work for CMS.

Achievements and Awards

2020	**JEST 2020** : Qualified with All India Rank 631 **INSPIRE-DST Fellowship** : Valid from 26th November, 2020
2019	**CSIR-NTA NET, December 2019** : Qualified Lectureship (India) with Rank 046 **SLET, 2019** : Qualified Lectureship (Within N-E India) **Gold Medal** in M.Sc. Physics from Tezpur University, India

Skills

Technical Skills	Advanced skills in C++, basic python, ROOT, and LaTeX Experienced in machine learning using tensorflow, scientific python Basic knowledge of MATLAB and Mathematica, GPU programming (CUDA)
Languages	Fluent in English, Hindi and Assamese (mother tongue) Basic knowledge in Chinese (2 semester add-on course during M.Sc.)
Co-curricular	Painting in different media - oil, acrylic and digital Good with acoustic/electric guitar Science writing and outreach in Assamese/English

Declaration

I hereby declare that all the information furnished above is true to the best of my knowledge and belief.

Prachurjya Pran Hazarika
July 17, 2023
Pune, India