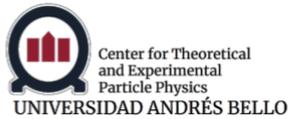


Summer internships SAPHIR - UNAB - 2026 edition



Report of Contributions

Contribution ID: 1

Type: **not specified**

Neutral Meson Production in Low-Energy Diffractive Processes with Pythia 8

This work presents a study of neutral meson production in diffractive collisions using the Pythia8 event generator. Cross sections and momentum transfer distributions are analyzed for double diffractive processes in a fixed-target scheme at beam energies of 10, 39.1, and 40 GeV. The analysis compares the SoftQCD and LowEnergyQCD physics scenarios, assessing their performance in describing diffractive neutral meson production. The results show stability in diffractive production in the high-energy regime and validate the hierarchy of cross sections predicted by non-perturbative QCD.

Authors: MONCADA AGUAYO, Benjamin Ignacio (UNAB); CARREÑO SALINAS, Isidora Isabel (UNAB)

Presenters: MONCADA AGUAYO, Benjamin Ignacio (UNAB); CARREÑO SALINAS, Isidora Isabel (UNAB)

Session Classification: Posters

Contribution ID: 2

Type: **not specified**

Control and Monitoring Interface for the ITk-ATLAS MOPS-Hub System

The ATLAS Inner Tracker (ITk) upgrade requires reliable and scalable control systems for power distribution and detector monitoring. The Monitoring of Pixel System (MOPS) is a radiation-hardened ASIC for monitoring front-end electronics used in the Inner Tracker. The MOPS-Hub is a dedicated aggregation and control platform that interfaces multiple MOPS devices, concentrating power monitoring and telemetry data and providing a communication bridge to higher-level control systems. This work presents the design and implementation of a Control and Monitoring Interface for the MOPS-Hub, combining embedded firmware and a graphical user interface (GUI) to enable monitoring hardware and real-time interactions. The system integrates Low-level firmware on an Arduino-based controller; a custom binary framed UART protocol; a Python-based GUI for user level interaction, and a mode that facilitates the validation of CAN communication protocol, all of these things allowing on demand manipulation of LDO regulators and ADC monitoring, streamlining the hardware testing process compared to traditional command-line methods.

Author: ESPINOZA QUINTEROS, Alexis Fabián (UTALCA)

Presenter: ESPINOZA QUINTEROS, Alexis Fabián (UTALCA)

Session Classification: Posters

Contribution ID: 3

Type: **not specified**

Inverse Muon Decay Reactions at SND@LHC and FASER ν

In long-baseline neutrino experiments, the systematic uncertainty associated with neutrino flux remains one of the primary challenges for precision measurements. Inverse Muon Decay (IMD) has a unique characteristic since it's a purely leptonic process and its cross-sections can be theoretically calculated with precision. We can study the IMD reactions at SND@HL-LHC and FASER by simulating neutrino interactions with GENIE3. Considering a tungsten (W184) target, the muonic neutrino fluxes for the pseudorapidity regions at SND ($7.2 < \eta < 8.6$) and FASER ν ($\eta \leq 8.3$) with neutrino energies up to few TeV.

Author: MELLA ALVAREZ, Fernanda (UC)

Presenter: MELLA ALVAREZ, Fernanda (UC)

Session Classification: Posters

Contribution ID: 4

Type: **not specified**

Control System of the MOPS-Hub for ITk-ATLAS Based on Arduino and FPGA

This work presents the development of a student oriented control system for the MOPS-Hub crate for the ITk-ATLAS detector, based on an Arduino microcontroller and an FPGA platform. The project includes fixes and improvements to the existing Arduino firmware, contributing to a better understanding of the system. Additionally, a low-level control and monitoring system for a single Card Interface Card (CIC) was implemented using a CORA Z7 FPGA, relying exclusively on the Programmable Logic (PL). Communication is achieved using SPI and UART, enabling LDO control and ADC monitoring for each channel.

Author: DONOSO BASTIAS, Francisca Nazarena (USM)

Presenter: DONOSO BASTIAS, Francisca Nazarena (USM)

Session Classification: Posters

Contribution ID: 5

Type: **not specified**

Energy Deposition in Plastic Scintillator bars for Electrons, Pions, and Muons at 150 GeV/c from SPS@CERN

This study characterizes a particle detector prototype based on 7mm width plastic scintillator bars coupled to wavelength-shifting (WLS) fibers and SiPM readout. To validate the detector response, we measured the energy deposition of 150 GeV/c electrons, muons-, and negative pions from the H4 beamline at the CERN SPS. The experimental results are benchmarked against analytical models (Landau–Vavilov–Bichsel) and Geant4 Implementation.

Author: SOTO PEZOA, José Luis (UNAB)

Presenter: SOTO PEZOA, José Luis (UNAB)

Session Classification: Posters

Contribution ID: 6

Type: **not specified**

Center-of-Mass Electronics characterization for miniPET Implementation

Image reconstruction in positron emission tomography (PET) remains a significant technical challenge. In this work, we report the characterization of front-end electronics (FEE) based on Anger logic designed to read out an array of 21 Multi-Pixel Photon Counters (MPPCs). This photosensor array is optically coupled to an array of wavelength-shifting (WLS) fibers interfaced with a LYSO crystal matrix. The FEE was characterized using an LED positioned in front of each MPPC. Signal processing was performed within ROOT, allowing determination of the single-photoelectron response, and Anger logic ratio for the MPPC array. In addition, the relative motion of the two detector planes used for reconstruction was automated via an Arduino-based control system.

Author: CÓRDOVA SALVO, María José (UNAB)

Presenter: CÓRDOVA SALVO, María José (UNAB)

Session Classification: Posters

Contribution ID: 7

Type: **not specified**

Characterization of a Plastic Scintillator Bar Array and Cosmic Ray Flux

We present the characterization of two planes composed of 8 bars ($125 \times 4 \times 0.7 \text{ cm}^3$) made by plastic scintillator coupled to two WLS fibers and read out by four MPPCs at the ends. We performed an event-by-event analysis of the raw signals and implemented a coincidence logic to obtain the SPE calibration using cosmic-ray runs. A monitoring system was established after data quality control.

Author: SANTIBAÑEZ ALVAREZ, Mauricio Alexander (UNAB)

Presenter: SANTIBAÑEZ ALVAREZ, Mauricio Alexander (UNAB)

Session Classification: Posters

Contribution ID: 8

Type: **not specified**

CORSIKA8 for Low-Energy Primary Particles

We implemented a CORSIKA8 simulation for proton air showers (1–100 TeV, 45°), optimizing large-scale simulations on the SAPHIR cluster via Slurm Job Arrays and thinning. By analyzing Lateral Distribution Functions (LDF) and Energy Spectra, we verified the framework's physical consistency against standard literature. Results confirm that CORSIKA8 reproduces the expected morphological separation between muonic and electromagnetic components.

Author: GÓMEZ RAMÍREZ, Roberto Renato Felipe

Presenter: GÓMEZ RAMÍREZ, Roberto Renato Felipe

Session Classification: Posters