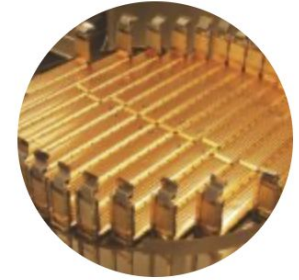


Electronics



ELETTRONICA



UNIVERSITÀ
DEGLI STUDI
DI PADOVA



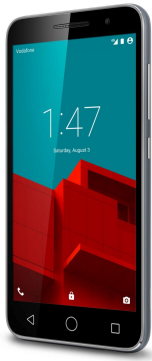
INAF
ISTITUTO NAZIONALE
DI ASTROFISICA

**Università degli Studi di Padova, INFN, INAF,
Politecnico di Torino Università di Cagliari, Università
di Napoli Federico II, Università di Bari Aldo Moro,
Gran Sasso Science Institute**

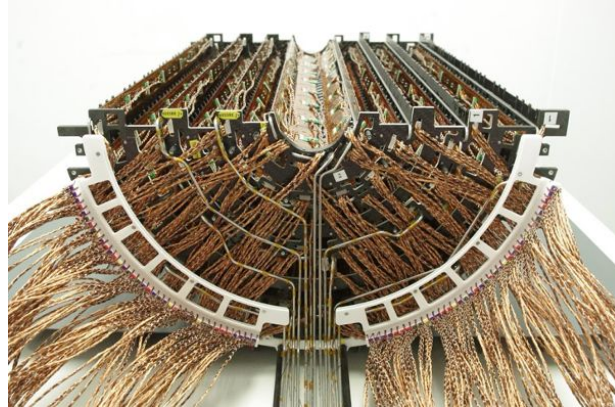
Electronics is...

Electronics is a scientific and engineering discipline that studies and applies the principles of physics to design, create and operate devices that manipulate electrons and other particles...to process information!

Electronics is ubiquitous...



In every day life...



...and in science

Possible research topic in the PhD

- Analog and digital microelectronics for detector readout
- Sensor and detector networks
- Radiation damage and radiation tolerant electronics
- RF electronics for detectors
- Power electronics
- Control electronics
- Diagnosis and safety for accelerators and detector
- Radio communications
- ...

What to learn

- Several training courses are offered by the partner Universities, INAF and INFN to cover many different aspects of electronics.
- Course topics cover: design of integrated circuits, HDL programming of FPGAs and SoCs, Numerical Simulations with TCADs, Radiation hardness of detectors and electronics, DAQ systems, Cryogenic sensors for astroparticle physics, Rare event search with TPCs, Cabling and Shielding for low noise applications, Advanced scientific programming with matlab, etc...

Our students and topics

TITOLO	SEDE	TIPOLOGIA BORSA	CURRICULUM	DOTTORANDO	RELATORE	CORRELATORE
Progetto e caratterizzazione di scheda di acquisizione dati per esperimenti di fisica ad alta energia con interfaccia Ethernet 1G/10G rame/fibra	Università di Genova	Ex DM 118/2023	Elettronica	Bzeih Fatima fatima.bzeih@studenti.unipd.it Fatima-bzeih@hotmail.com	Paolo Musico Paolo.Musico@ge.infn.it	Paolo Gastaldo Paolo.Gastaldo@unige.it Saverio Minutoli saverio.minutoli@ge.infn.it
Definizione, sviluppo e test di elettronica di front-end per rivelatori per astrofisica delle alte energie	INAF - Osservatorio OAS di Bologna	Fondi propri	Elettronica	Sharma Ajay ajay.sharma@studenti.unipd.it ajayforphysics@gmail.com	Riccardo Campana riccardo.campana@inaf.it	Enrico Virgilli enrico.virgilli@inaf.it
Progettazione di elettronica di lettura in tecnologia CMOS 28nm per futuri rivelatori a pixel	INFN Bari	Fondi propri	Elettronica	Bermudez Marquez Ciro Fabian cirofabian.bermudezmarquez@studenti.unipd.it cirofabian.bermudez@gmail.com	Flavio Loddo flavio.loddo@ba.infn.it	Francesco Licciulli francesco.licciulli@ba.infn.it
Sviluppo su FPGA di IA per riconoscimento di immagini in ambienti radioattivi	INFN Roma Tre	Fondi propri	Elettronica	Islam Ammad UI ammadul.islam@studenti.unipd.it ammadulislam92@gmail.com	Andrea Fabbri andrea.fabbri@roma3.infn.it	
Studio delle prestazioni degli ASICs della famiglia TimePIX per 3-D track imaging per la Polarimetria X in Astrofisica	INAF-IAPS di Roma	Fondi propri	Elettronica	Imtiaz Saba saba.imtiaz@studenti.unipd.it sabaimtiaz110@gmail.com	Fabio Muleri fabio.muleri@inaf.it	Alessandro Di Marco alessandro.dimarco@inaf.it
Nuove tecnologie ottiche e RF over fiber per i radiotelescopi di nuova generazione	Istituto Nazionale di Astrofisica – Istituto di Radioastronomia	Fondi propri	Elettronica	Anwar Maida maida.anwar@studenti.unipd.it maidaanwar2021@gmail.com	Federico Perini federico.perini@inaf.it	Jacopo Nanni jacopo.nanni3@unibo.it
CAP - CMOS Advanced Pixels	INFN Padova	Fondi propri	Elettronica	Rignanese Michele michele.rignanese.1@studenti.unipd.it michelerignanese17@gmail.com	Piero Giubilato piero.giubilato@unipd.it	Serena Mattiazzo serena.mattiazzo@unipd.it



Host institution & Research Group

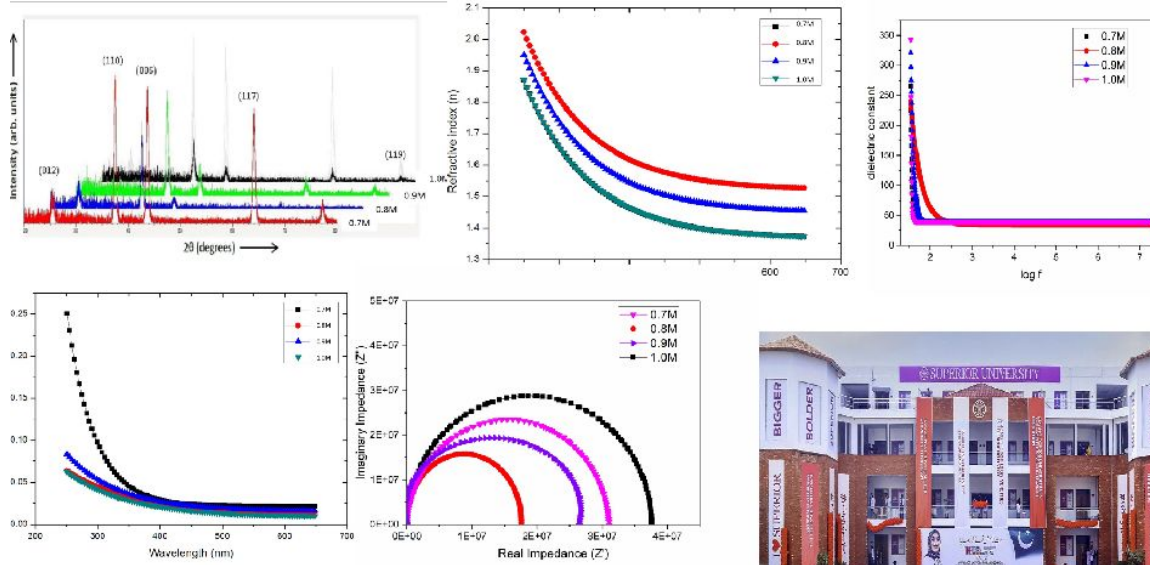




Previous Research and Work Experience



Effect of Molarity on Optical and Dielectric Properties of Alumina Thin Films by sol gel spin coating method



Result of Different analytics
XRD, FTIR, Impedance analyzer



Centre of Excellence in Solid State Physics



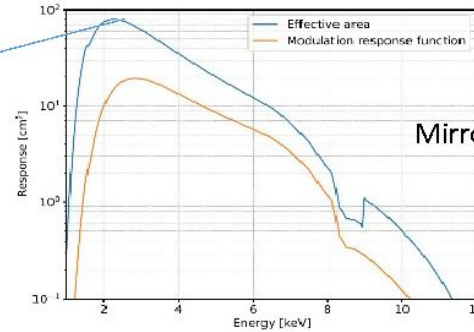
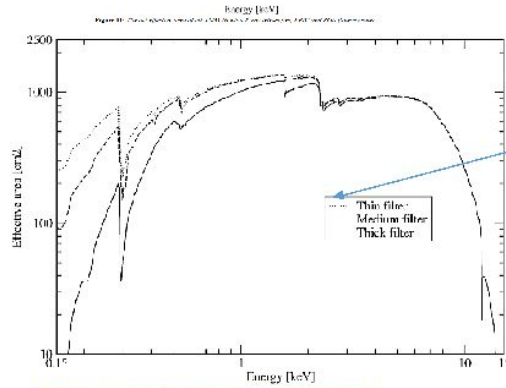
Superior University



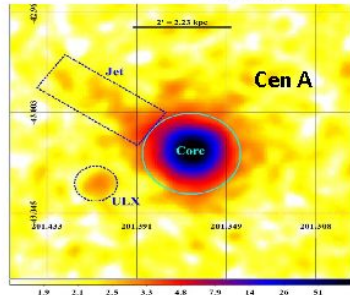
Centre for High Energy Physics



Improving and expanding the capabilities of X-ray Polarimetry beyond IXPE (2-10 keV)
Low energy Polarimeter LEP



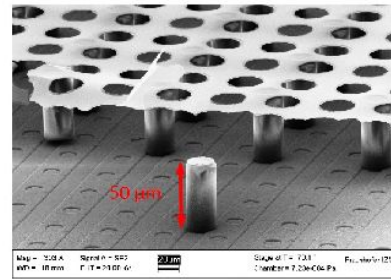
Mirror + Detector **Larger Effective area & better Point speed funtion**



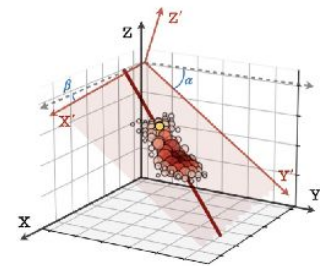
36 % MDP on the jet (100 ks)
Ehlert et al., 2022



TimePix3



Gridpix Detector



3D-track of photoelectron

Educational background

- **Bachelor degree in Physics** at University of Padova. During the bachelor thesis and the first months of the master degree, I did data analysis, and I worked with the CMS collaboration.
- During the **master degree** in Physics (curriculum: fundamental interactions) in Padova, I mainly studied topics related to **High Energy Physics** experiments, particularly focusing on detectors, electronics and technology.
- I completed my master degree with a thesis based on characterization of **silicon pixel detectors** for the **ALICE** experiment upgrade.

Michele Rignanese



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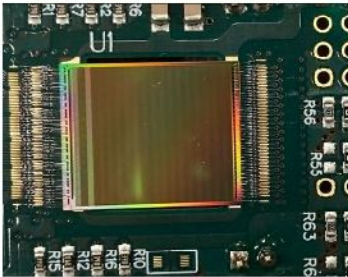
PhD research

- **Hosting university:** University of Padova
- **Supervisor:** Prof. Piero Giubilato

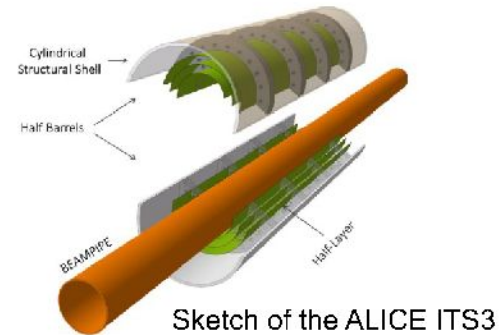
Michele Rignanese

The research activities of PhD will be focused on the characterization and development of **Monolithic Active Pixel Sensor (MAPS)**. During the first year I mainly focused on the characterization of the **ARCADIA** sensor, a MAPS prototype developed by the **INFN** collaboration. Later on I will also be involved in the development of the new sensors for the ALICE Inner Tracking System upgrade.

ARCADIA
ΠΠΠΠΠΠΠΠΠΠΠΠΠΠΠΠ



Picture of the ARCADIA chip: an array made by 512x512 pixels





UNIVERSITÀ
DEGLI STUDI
DI PADOVA

PhD Student: Fatima Bzeih



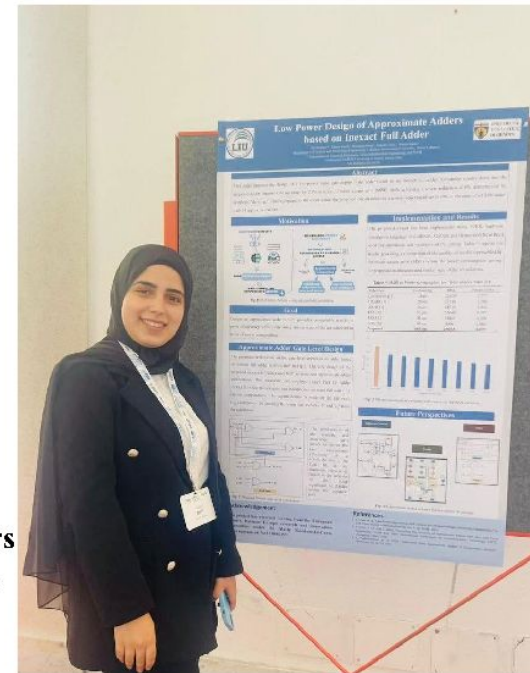
Università
di Genova

❖ Educational Background:

- Master of Science in Electronics Engineering.
- Lebanese International University.
- Graduated: September 2023.

❖ Research Experience:

- **Master's Thesis:**
- **Topic:** Low Power Design for Adder and Coordinate Rotation Digital Computer (CORDIC).
- **Achievements:** Published one paper “**Low Power Design of Approximate Adders based on Inexact Full Adder**”, with further promising results seeking publication soon.



Current PhD Position and Research Focus

❖ **Content:**

- **Administrative Headquarters:** University of Padua.
- **Partner Institution:** University of Genoa, Physics Department and INFN sezione di Genova.
- **Supervisor:** Prof. Paolo Musico.

Fatima Bzeiz

❖ **Research Topic:**

- **Title:** “Design and Characterization of a Data Acquisition Board for High Energy Physics with 1G/10G Copper/Optical Ethernet Connection”.
- **Main Objective:** Utilize Ethernet technology in place of VME.

❖ **Methodology:**

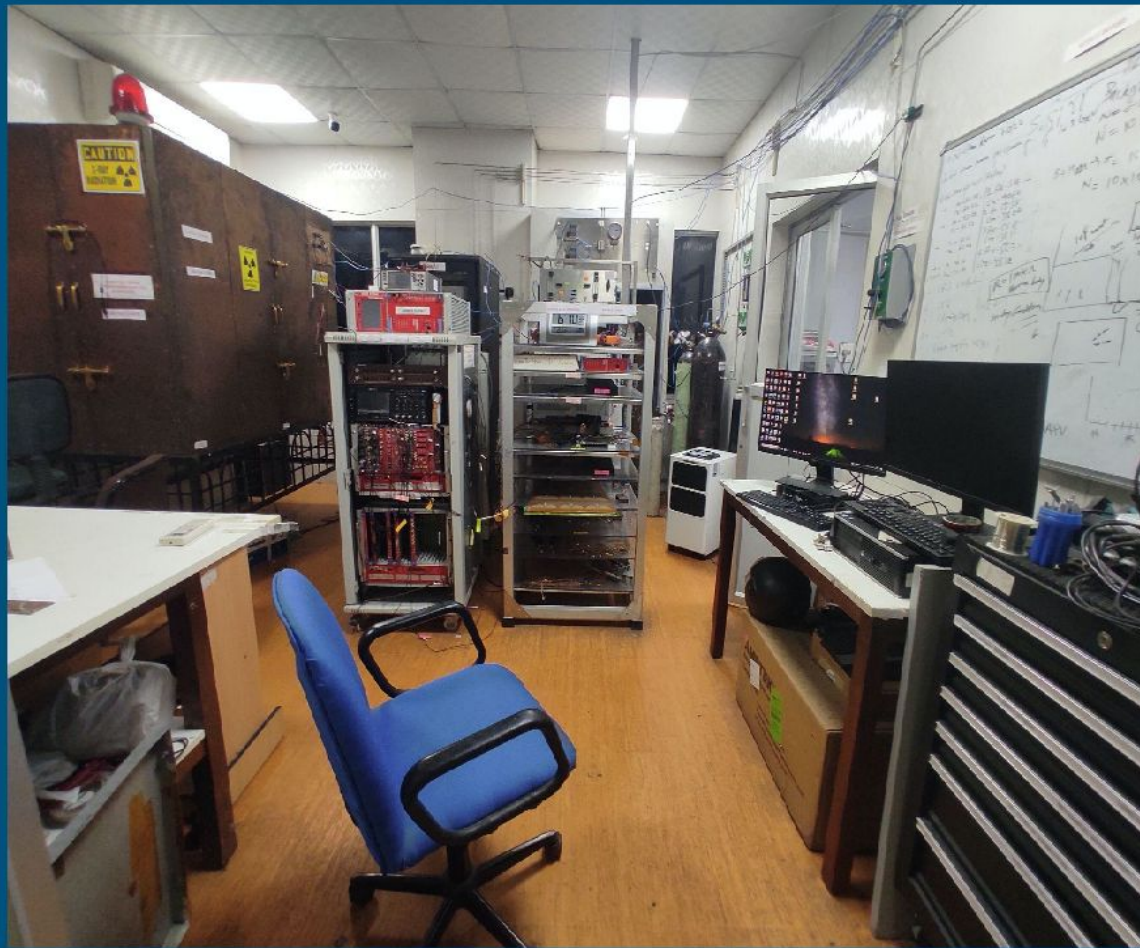
- Designing a new MPD.
- Using Kintex-7 for FPGA hardware tasks.

✓ **Achievements so far:**

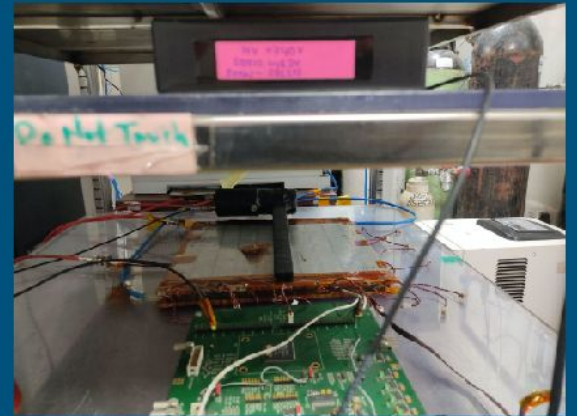
- Programming ADC using Kintex-7 FPGA with deserializer.
- Built 1G Ethernet connection, successfully pinged and opened sockets for read/write operations.

❖ **Future Work:**

- Continue transitioning from VME to Ethernet in MPD.



GEM Lab
Sharma Ajay



Education and Previous Lab Experience

Sharma Ajay

Education

- **Master's Degree in Physics**
- University of Delhi

Past Research Work

- **Research Project on Resistive Plate Chambers (RPC)**
- **Department:** Physics and Astrophysics, University of Delhi
- **Supervisors:** Dr. Aman Phogat and Dr. Mohammad Naimuddin
- **Focus:** Development and testing of eco-friendly gas mixtures for RPC detectors

Key Activities

- Principle and modes of operation of RPCs
- Gas calibration and choice of gases for optimal performance
- Development and testing of front-end electronics and readout systems
- Construction and characterization of RPC detectors



Current Research at OAS-INAF, Bologna



Sharma Ajay

Current Position

- **PhD Student at OAS-INAF Bologna**
- **Supervisors:** Riccardo Campana and Enrico Virgili
- **Project:** Development of Test Equipment for Silicon Drift Detectors
- **Duration:** First year of research activity

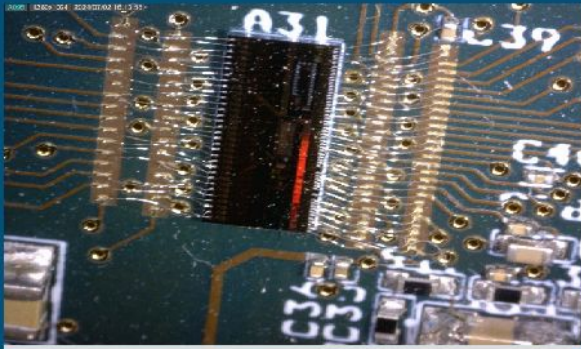
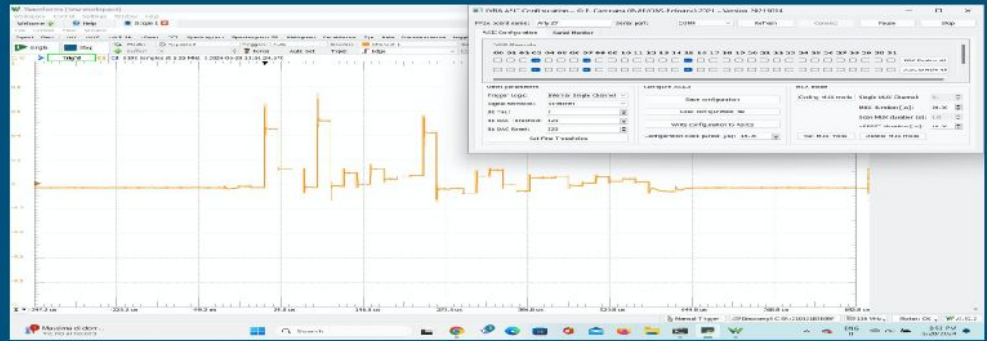
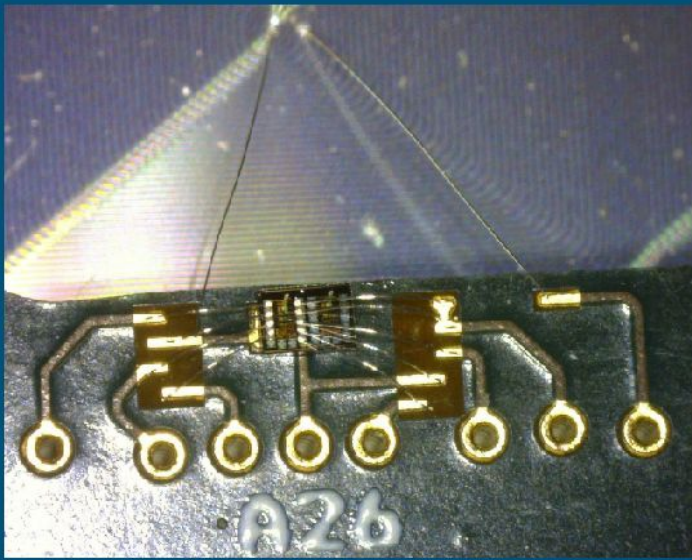
Research Focus

- **Objective:** Development of test equipment for a new prototype of front-end electronics for Silicon Drift Detectors in a high-energy astrophysics experiment

Key Activities

- Development and optimization of FPGA firmware and interface client PC software
- Laboratory testing of the setup with and without Silicon detectors to characterize the FEE and detectors
- Aiming to deliver a well-developed test equipment along with comprehensive spectroscopic data and analysis
- Test and development of prototype (SDD+ASIC+CSI(TI), HERMES heritage) for the study of the resonance lines of scintillator crystals







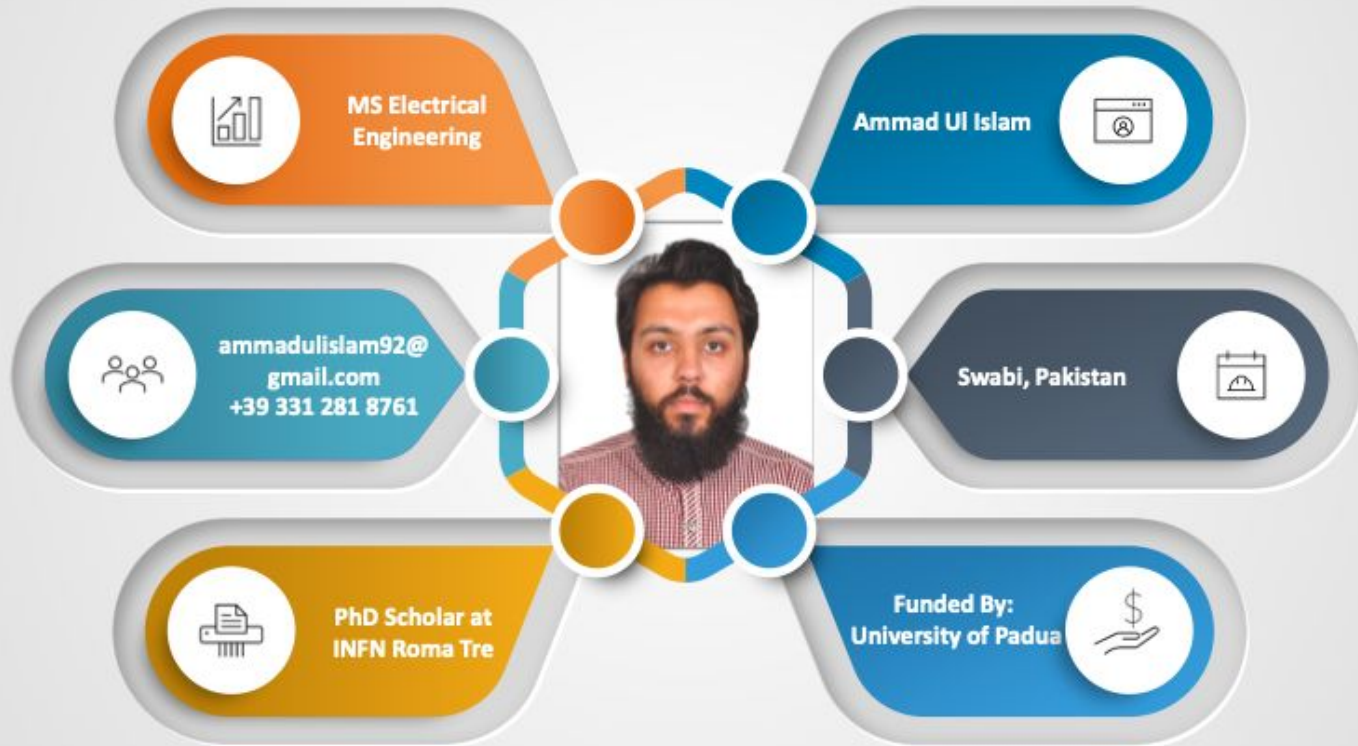
Self Introduction

Presenter:
Ammad Ul Islam

**PhD in Technologies for
Fundamental Research in
Physics and
Astrophysics(Electronics)**

Supervisor:
Prof. Dr. Andrea Fabbri

Personal Information





Personal Information



- Name: Ammad Ul Islam
- Born in: Swabi, Pakistan



Education



- BS in Telecommunication
- MS in Electrical Engineering(Signal and Image Processing)



Professional Experience



- GTE in PAC Kamra
- IT TSE in HU, Mansehra
- Project Manager, Allure Services and Solutions Pvt. Ltd.



Research Experience



- Image Processing
- Signal Processing
- Hyperspectral Image Processing
- Forensic Document Analysis
- Writer Identification
- Ink Mismatch detection
- Deep Learning
- Pattern Recognition
- Computer Vision
- Steganography



Current Position



- PhD in Technologies for Fundamental Research in Physics and Astrophysics
- INFN Roma Tre
- Image recognition development on FPGA through AI in harsh environment.
- Funded By University of Padova
- Hosted by INFN, Roma Tre

Research Objectives/Goals



Background

Maida Anwar
(Pakistan, 12/06/1996)



Education

- **Bachelor of Science in Physics**, University of Gujrat, Pakistan (2015-2019)
 - **Thesis Title:** “First Principles Study of Electronic and Optical Properties of Mg- Doped SrTiO_3 ”
- **Master of Philosophy in Physics**, University of Gujrat, Pakistan (2019-2021)
 - **Thesis Title:** “A DFT Study of Lithium Metal Adsorption on S-borophene for the Application of Anode Material”

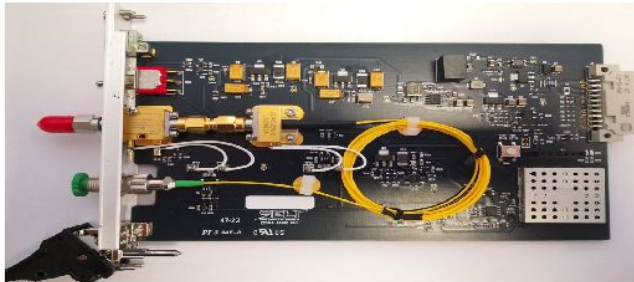
Work Experience

- **Teaching**
 - Govt. Asghar Ali Degree College, Gujrat Pakistan (March-May 2022)
- **Visiting Lecturer**
 - Department of Physics, University of Gujrat, Pakistan (May 2022- Jan 2024)

Current RF-over-Fiber link for SRT



1-18GHz OTX



1-18GHz ORX

- **Granted of the TFPA PhD scholarship #23**
- **Hosting Institution:** INAF/IRA
- **Supervisor:** Federico Perini (INAF/IRA)
- **Co-Supervisor:** Jacopo Nanni (UniBo)
- **PhD Topic:** Realization of wide band radio over fiber systems for the downlink of INAF VLBI antennas
 - Study of the current optical link realized for SRT
 - Direction of research: Improvement of the dynamic range from architectural and component perspective

Introduce myself

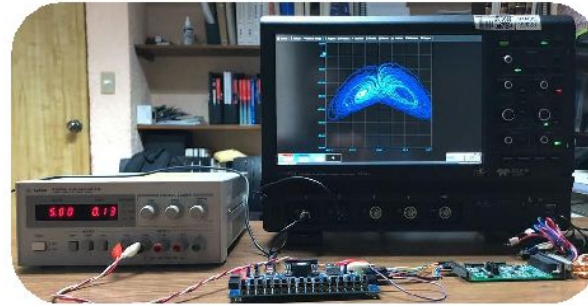


Name: **Ciro Fabian Bermudez Marquez**

Nationality: Mexican

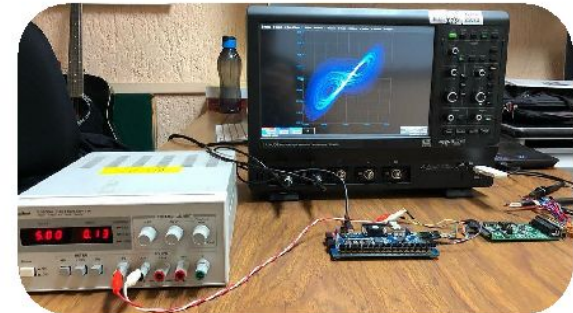
Educational background:

- Bachelor's degree in electronics (BUAP)
- Master's degree in electronic instrumentation (INAOE)



Previous research:

- Hyperchaotic systems, bifurcation analysis, digital circuit design, FPGA implementation, and applications in fields such as image encryption and weather modeling.



Ciro Maquez

Current position

Hosting institution: INFN Sezione di Bari

Tutor: Flavio Loddo

Topics: ASICs, Verification, UVM, Digital Design, HEP, FPGA

Description:

The research focuses on the development of a UVM (Universal Verification Methodology) verification framework to prove the correctness of pixel chip design to be used in future projects in the field of High Energy Physics (HEP). Moreover, the modeling of pixel-based detectors at a high level of abstraction to perform architectural studies. This will provide metrics to compare different solutions to satisfy functional and non-functional requirements, both at detector and readout chip level.



Istituto Nazionale di Fisica Nucleare
Sezione di Bari

