

# Data Acquisition for Detectors

By: Ely Leon  
Instituto Progreso Latino  
Chicago, IL

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# Why Physics?

I have been always interested in understand how things work.

I also enjoy building things from scratch

# My project:

My original goal was to readout TDCs and ADCs at the Test Beam Facility using CAMAC.

The readout will be added to the existing DAQ application on MIDAS.

Steps:

- 1- Learn Python
- 2- Readout test stand with python
- 3- read out test stand with MIDAS
- 4- Read detector with MIDAS
- 5- Learn Linux

# Learning CAMAC:

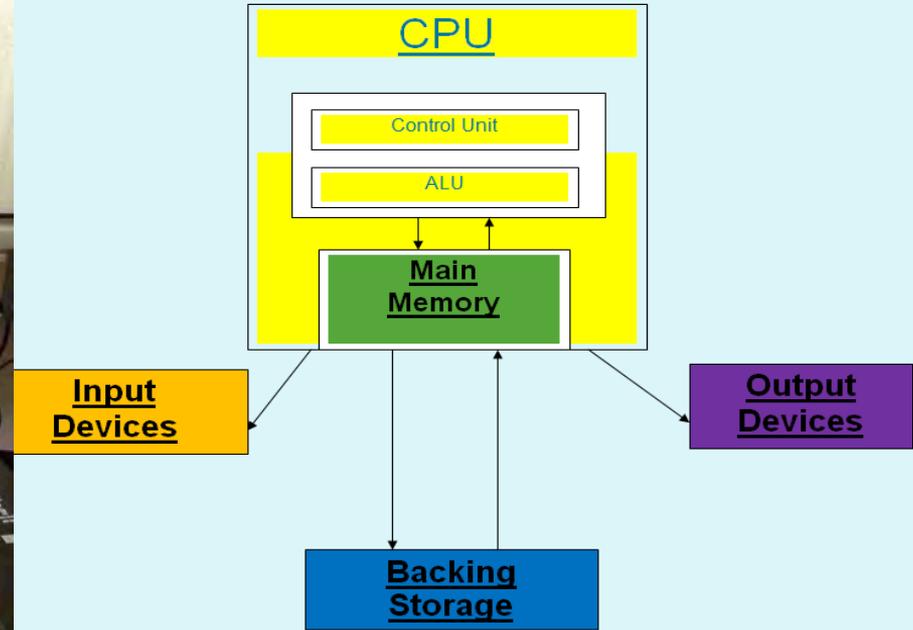
- CAMAC is a very important part of DAQ that is use today.
- Data rate depends on rates of interesting events.



# Data flow

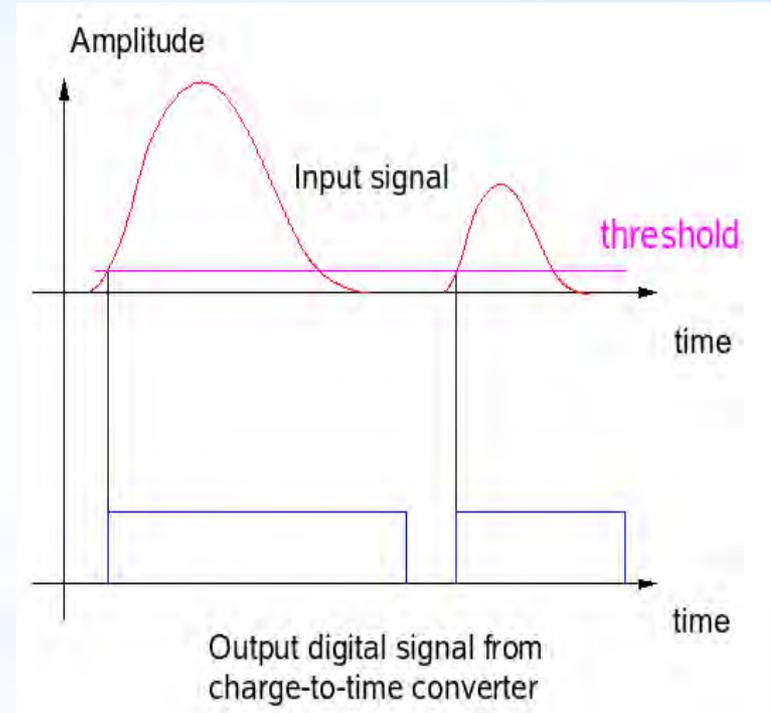


## Logical Computer System



# TDC (Time to Digital Converter)

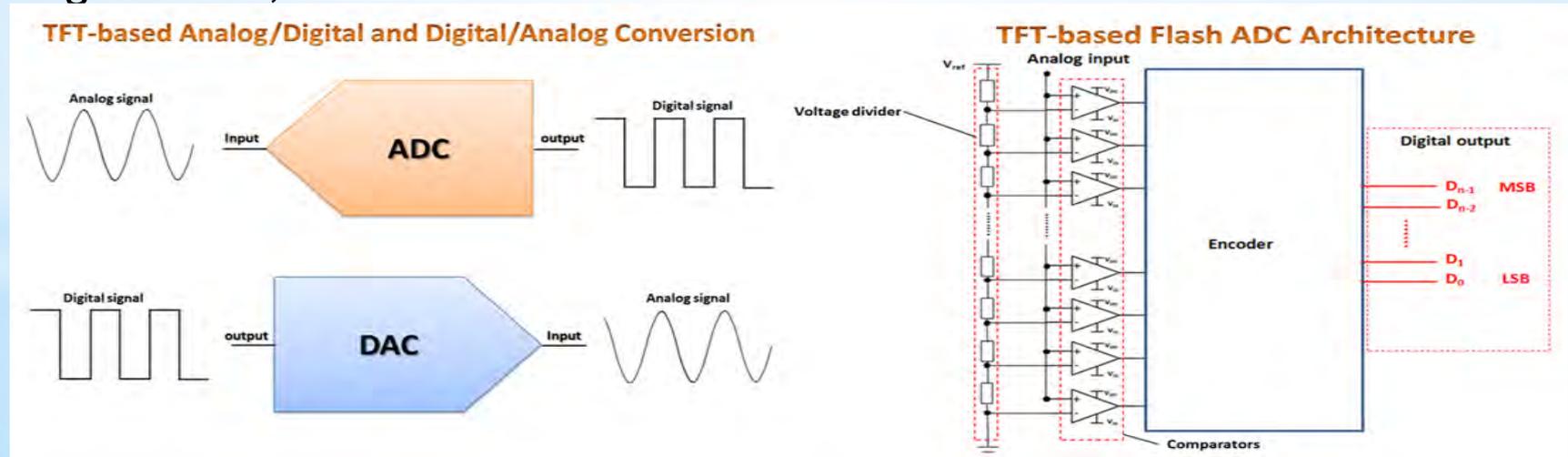
TDC is a electronic device that obtain the time interval between two signals (start and stop) in a digital form.



# ADC ( Analog to Digital Converter)

ADC converts analog signal (current, voltage, or electric charge) into digital data (usually binary).

λ-Digital data can be transmitted, manipulated, and stored without degradation,



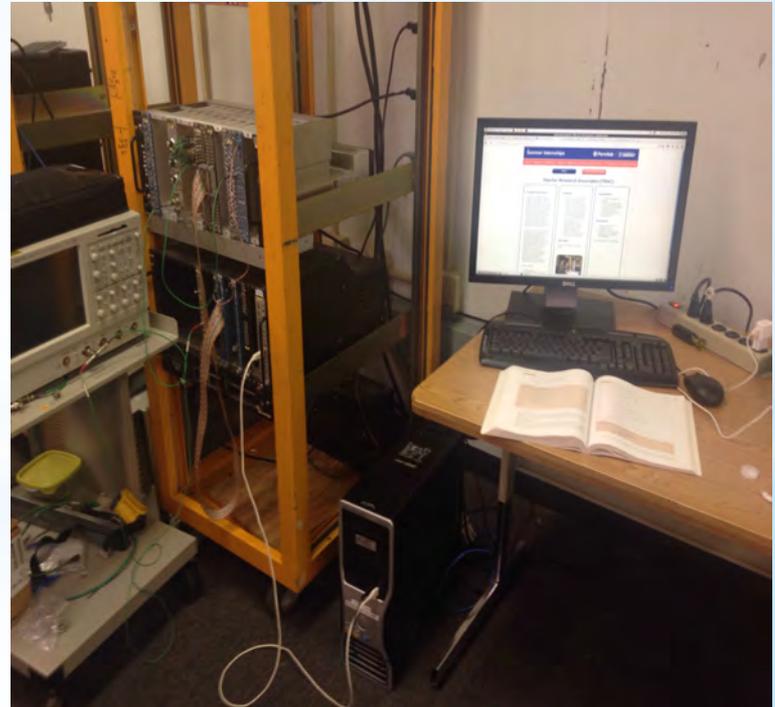
# Scaler ( Jorway Model 84 )

Scaler is a single-width, high-speed CAMAC compatible module. It features a discriminator front-end to provide reliable counting, independent of input waves shape. the Scaler will count pulses as narrow as 3 nsec, at rates in excess of 100 MHz (125MHz typical). Data is read out on the CAMAC dataway upon receipt of appropriate command.

# Instrument:

I was introduced to a small set up in the test beam facility. The setup consisted on:

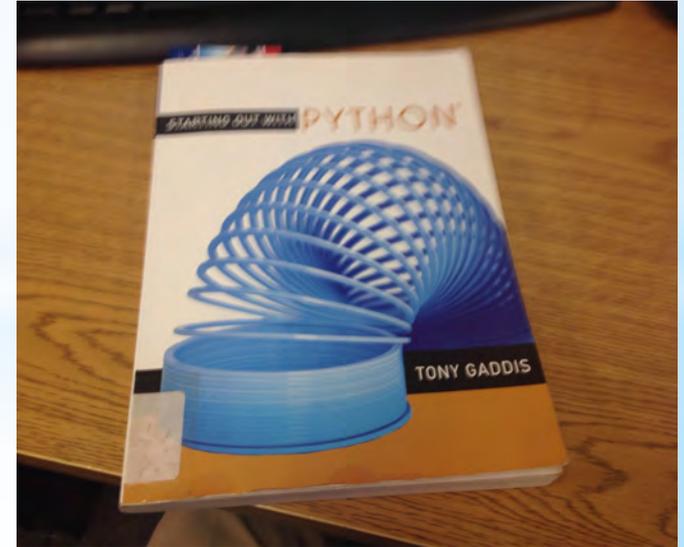
- Two scintillators
- Scaler
- CAMAC crate
- USB cable
- Computer. (linux, python)



# Why Python? Python is a high level programming language that itself is powerful, fast, friendly, easy to learn, and free.

Learning Python. I quickly read and practice many algorithm to understand the use python language.

- fundamentals of programming.
- Input/ output
- Simple functions
- Decision structures and Boolean logic
- Functions and modulus
- Sequence and list
- Object oriented programming (progress)

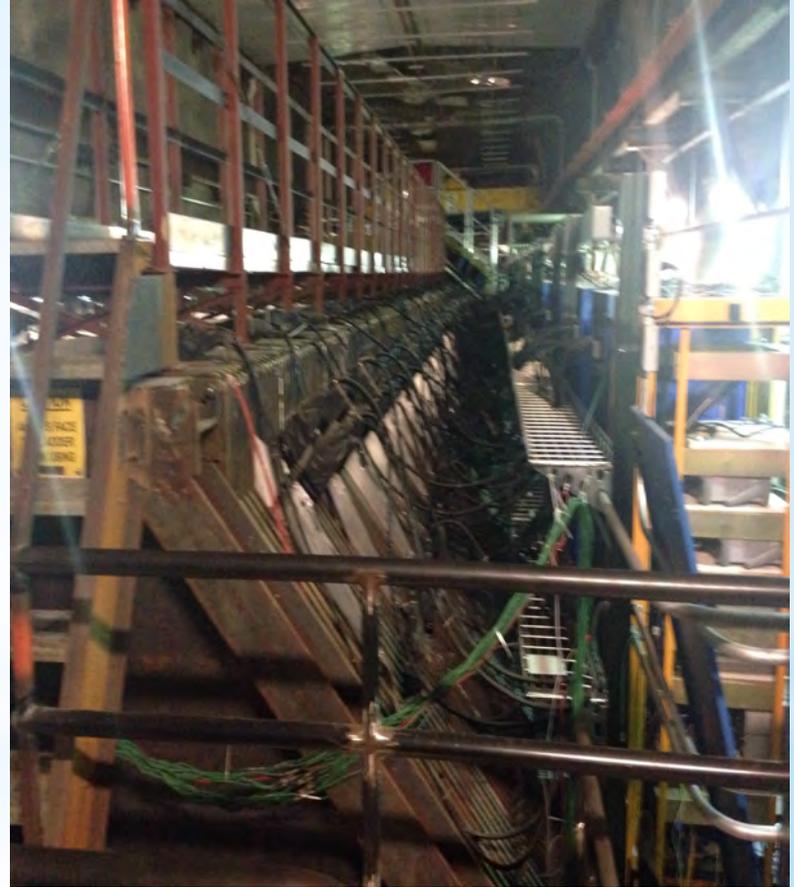


## Conclusion:

DAQ is very important part of detector experiments. It requires a good computer, efficient electronic modules such as TDC, scaler, and fast and efficient Software (Python) to read and analyze data from experiments such as NOVA, and Telescopes.

## Future:

- I will continue learning python
- Write Python program to use in TDCs (Lecroy3377) and ADC.
- I want to find a way to implement python in my physics class.



knowledge:

I personally want to appreciate people how help me attend TRAC, teach me particle physics, and learn DAQ

- TRAC staff and Education Resources
- Dr. Harry Cheung
- Dr. Geoffrey Savage
- Test beam Facility staff
- TRAC members
- Speakers, tour guide
- Fermi National Laboratory staff

Questions?

Thank you.



I wish you enjoy your summer!