

## SYLLABUS DEL CORSO

### Digital signal processing for nuclear physics

2122-86R-DigSignal

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#### Title

Digital signal processing for nuclear physics

#### Teacher(s)

Dott. Andrea Abba

#### Language

English

#### Short description

1. Application of digital signal processing in nuclear physics
2. Particle detectors and analog front-end
3. Signal digitalization
4. Measuring position of interaction, energy and time of arrival
5. Energy measurement:

6. High resolution time of arrival measurement

TAC - time to amplitude converters

TDC - time to digital converters

Applications in high energy/neutron physics

7. Spatial detectors

Position sense detectors (gamma camera/He3 position sense tube)

energy and position of interaction reconstruction

Pixelated detectors. SiPM MPPC detectors

ASIC to readout pixelated detectors.

Usage of a Citiroc ASIC on DT5550W to reconstruct SiPM image of a laser spot

8. Custom firmware development with SciCompiler and detector emulator

Design of digital logic for trigger

Waveform digitalization

Digital charge integration

Trapezoidal filter

Using of time correlation to isolate Na22 (emulated) source from the background

Implementation of a 500ps resolution TDC

## **CFU / Hours**

12 hours

## **Teaching period**

January- March

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