



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Digital signal processing for nuclear physics

2122-86R-DigSignal

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#### **Titolo**

Digital signal processing for nuclear physics

#### **Docente(i)**

Dott. Andrea Abba

#### **Lingua**

English

#### **Breve descrizione**

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:

Digital Pulse Shape Analysis

Trigger Circuit  
Baseline drift compensation  
Digital Filter Synthesis  
Pileup rejection  
Spectrum Calculation

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.

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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 / Ore**

12 hours

## **Periodo di erogazione**

January- March

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