UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Digital signal processing for nuclear physics

2122-86R-DigSignal

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