

# UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

# SYLLABUS DEL CORSO

# Digital signal processing for nuclear physics

2122-86R-DigSignal

## 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.
- 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