



UNIVERSITÀ  
degli STUDI  
di CATANIA

DIPARTIMENTO DI FISICA E ASTRONOMIA

DOTTORATO DI RICERCA IN FISICA

ANNO ACCADEMICO 2017 - 2018

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## Analog and digital electronics for modern detectors

2 CFU

### Teaching staff

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### Program of the course:

Introduction on detection mechanisms; simplified model of the detector and calculation of electronic noise, signal-to-noise ratio (SNR). Analysis of measurement strategies. Optimization of SNR and its influence in the measure of time, charge, energy, event rate. Voltage, current and charge amplifiers. The preamplifier, the shaper, shaping of signals and signal-to-noise ratio. Ideal and lossy transmission lines in time and frequency domains. The SPICE simulator. Analog sampling and analog-to-digital conversion (ADC); Overview of programmable logic.

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### Bibliography:

- Helmuth Spieler - Semiconductor Detector Systems – Oxford University Press - 2005
- Laker, Sansen - Design of Analog Integrated Circuits and Systems - McGraw Hill - 1994
- Baher - Analog & Digital Signal Processing - J.Wiley – 1990
- Knoll - Radiation Detection and measurement - J.Wiley -1999