



UNIVERSITÀ
degli STUDI
di CATANIA



DIPARTIMENTO DI FISICA E ASTRONOMIA
“ETTORE MAJORANA”

DOTTORATO DI RICERCA IN FISICA
ANNO ACCADEMICO 2020/2021

TITLE

Quark physics at Jefferson Lab and Electron Ion Collider future perspectives

2 CFU

Teaching staff

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Program of the course:

Quark physics at JLAB: form factors studies, new frontiers on detectors and related experiments with CEBAF beam at 12 GeV.

The SBS (Super BigBite Spectrometer) facility in Hall A: magnetic spectrometer (HRS), tracker (GEM modules) and calorimeter (HCAL-J).

New technologies on tracker system, utilizing triple-GEM gas detectors: project, construction of modules in the cleaning room of Catania – Sezione INFN, tests with cosmic rays and protons and commissioning in JLAB.

The hadron calorimeter HCAL-J for SBS: joint project between INFN, JLAB and CMU (Carnegie Mellon University).

The single module: absorbers, scintillators, wavelength shifter guides and PMTs, light collection (93% efficiency), time resolution (≈ 1 ns) and DAQ system.

The arrangement of 288 modules in 4 sub-assemblies at JLAB and the construction of a mobile platform.

The proposed and approved experiments on form factors in the Hall A of JLAB.

The EIC (Electron Ion Collider) project and the future perspectives.

Bibliography:

B. Povh – Particelle e nuclei – Bollati Boringhieri

Sito Web del JLab : <https://www.jlab.org>

E. Cisbani – Overview of Nucleon Form Factor Experiments with 12 GeV at Jefferson Lab – EDP Sciences, 2014

C. W. de Jager et al. – The Super BigBite Spectrometer for Jefferson Lab Hall A –

F. Mammoliti et al. – Test of the GEM Front Tracker for the SBS Spectrometer at Jefferson Lab – CHERNE Workshop – Athens 2012

B. Wojtsekhowski – Nucleon form factors program with SBS at Jlab – IJMP: Conference Series, March, 18 2014

The Jefferson Lab PVDIS Collaboration – Measurement of Parity Violation in electron-quark scattering - NATURE vol. 506, pag. 67