Session Physics Beyond the Standard Model: theoretical FELLINI projects

Who?

Daniel Pablos Alfonso, INFN Torino

Ugo Marzolino, INFN Trieste

Alessandro Pilloni, INFN Roma

Pietro Rotondo, INFN Milano

INFN
Istituto Nazionale di Fisica Nucleare

Fellini
Fellowship for Innovation at INFN

Daniel Pablos Alfonso

Education

2011	Bachelor in physics at the University of Barcelona
2012	Master in physics at the University of Barcelona
2016	PhD in physics at the University of Barcelona

Positions

2017 - 2019	Postdoc at the McGill University, Montréal
2019 - 2021	Postdoc at the University of Bergen
Since 2021	FELLINI Fellow at INFN, Tourin

Expertise

- QCD
- Quark-gluon plasma
- Heavy ion collisions
- Jet quenching
- Relativistic hydrodynamics
- Monte Carlo simulations
- Deep learning

Ugo Marzolino

Education

2005	Bachelor in physics at the University of L'Aquila
2007	Master in physics at the University of Rome "La Sapienza"
2011	PhD in physics at the University of Trieste

Positions

2011 - 2011	Postdoc at the University of Salerno
2012 - 2013	Postdoc at the University of Freiburg "Albert-Ludwigs"
2012 - 2012	Invited researcher at the University of Toulouse III "Paul Sabatier"
2013 - 2017	Postdoc at the University of Ljubljana
2017 - 2019	Postdoc at the Ruder Boskovic Institute, Zagreb
Since 2019	FELLINI Fellow at INFN, Trieste

Expertise

- Entanglement theory
- Quantum information
- Quantum metrology
- Open quantum systems
- Quantum statistical mechanics

Alessandro Pilloni

Education

2006	Bachelor in physics at the University of Rome “La Sapienza”
2012	Master in physics at the University of Rome “La Sapienza”
2015	PhD in physics at the University of Rome “La Sapienza”

Positions

2006 - 2011	Founder and IT Manager of Skuola.net
2015 - 2018	Postdoc at the Jefferson Lab, Newport News
2018 - 2020	Postdoc at ECT, Trento
Since 2020	FELLINI Fellow at INFN, Rome

Expertise

- QCD phenomenology in nonperturbative regime
- Hadron spectroscopy
- Hadron-hadron interactions
- Weak decays

Pietro Rotondo

Education

2008	Bachelor in physics at the University of Milan
2011	Master in physics at the University of Milan
2016	PhD in physics at the University of Milan

Positions

2015 - 2016	Research Assistant at the University of Milan
2016 - 2017	Research Fellow at the University of Nottingham
2017 - 2019	Marie Curie Fellow at the University of Nottingham
Since 2020	FELLINI Fellow at INFN, Milan

Expertise

- Spin glasses
- Quantum Hall effect
- Cavity QED
- Neural network
- Statistical learning theory

FELLINI projects

Two projects focused on QCD and two on statistical physics

- Daniel Pablos Alfonso, INFN Torino - JetQGP

  Interplay of energetic jets with liquid quark-gluon plasma

- Ugo Marzolino, INFN Trieste - QE-TherMa

  Thermodynamic resources for quantum devices

- Alessandro Pilloni, INFN Roma - THREE-CP

  Nonperturbative QCD dynamics for determining CP violating phases in multibody weak decays

- Pietro Rotondo, INFN Milano - SPECTRA

  Machine learning foundations from a statistical physics perspective

Common ground

Connections

Diverse research projects with some common ground

- Applications of statistical physics tools:
  - ✓ phase transitions
  - ✓ relativistic hydrodynamics
- Machine learning foundations and techniques
  - ✓ neural networks
  - ✓ deep learning
- Nonperturbative QCD
  - ✓ collisions and decays
  - ✓ quark-gluon plasma
  - ✓ hadron-hadron interactions

Plan of the session

First part: theoretical FELLINI projects

- Ugo Marzolino, INFN Trieste - QE-TherMa
- Pietro Rotondo, INFN Milano - SPECTRA
- Alessandro Pilloni, INFN Roma - THREE-CP
- Daniel Pablos Alfonso, INFN Torino - JetQGP

Second part: experimental FELLINI projects

- Jacopo Pinzino, INFN Pisa - NA62LFUV
- Ruggero Caravita, INFN Trento - AMPIS
- Giuseppe Messineo, INFN Ferrara - APNS