



# COLLOQUIUM DFA

DECEMBER 5TH 2024 – 3 PM

AULA ROSTAGNI

YOUTUBE STREAMING

**FABIO MALTONI**

UNIVERSITÉ CATHOLIQUE DE LOUVAIN – BELGIUM

UNIVERSITÀ DI BOLOGNA – ITALY

## *Quantum Observables in High Energy Physics*

**Abstract:** Quantum Mechanics (QM), one of the most counter-intuitive and vanguard descriptions of fundamental phenomena ever conceived, is not only at the heart of our understanding of the Universe, of matter, and of its interactions, but has also gained a primary role in science and technology with a large range of applications to our everyday life going from computing, to information theory, to safe communications. While we currently have no motivation to think that QM would stop to describe phenomena at short distances, at least below the Planck scale, it is interesting to ponder to what extent fundamental quantum effects can be probed beyond the atomic scales ( $10^{-10}$  m). Such a question has recently gained further momentum after the observation of entanglement in the spin of top/anti-top quark pairs at the LHC, the highest energy accelerator experiment on earth, operating at the TeV ( $10^{-19}$  m,  $10^{-28}$  s) scale. Fabio Maltoni will review the main ideas and results of applying quantum information concepts and methods to the study of fundamental interactions and illustrate the perspectives.



**Fabio Maltoni** joined the Université catholique de Louvain in 2005, where he is currently "Professeur Ordinaire". Since 2018 he also holds a part-time position of "Professore Ordinario" at Università di Bologna, where he coordinated the theory and phenomenology group in the period 2019-2022. In 2015-2018, he was CP3 director, coordinating the scientific activities of about 70 members and implementing initiatives to foster collaboration among the different research lines and between theorists and experimentalists.