Martedì
15 dicembre
Aula A, ore 15:30

INFN PERUGIA

A.D. 1308 unipg

DIPARTIMENTO DI FISICA E GEOLOGIA

PERAPS 2026

The end of time?

Dedicated to the memory of Giorgio Immirzi

There are divergent millennial-old **linear** versus **cyclic-seasonal** notions of time in society and religious customs in the world at large. In Einstein's cosmology resulting from his general theory of relativity & gravitation, the answer to this fundamental question is related to a critical density of matter in the Universe below which it is open (expansion forever with a linear conception of time) and beyond which it is closed (periodic expansions followed by contractions leading to a cyclic seasonal conception of time). Present view is that we are too close to the critical density for a firm verdict. Recent astrophysical observations reveal supermassive black-holes residing at the center of most galaxies. Quantum considerations render the problem even more complicated: time-crystals; Euclidean time; restricted time-travel and space-like motions are allowed. I shall close this seminar with a bold result published by our PG group (Giorgio Immirzi, Orlando Panella, Simone Pacetti & I) that relates the recently observed high-energy cosmic-ray photons as generated by nuclear reactions by PeV protons (about a hundred times greater than the LHC energy) at the surface of a Kerr black hole at the center of our Milky Way (that is endowed with a BH four million times the mass of our Sun).

