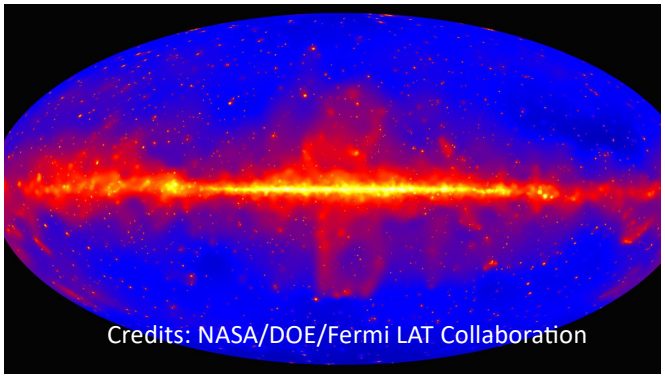
Four Lectures on the Photon History

"All those 50 years of careful pondering have not brought me closer to the answer to the question: 'What are light quanta?' Today any old scamp believes he knows, but he's deluding himself."
(A. Einstein in a letter to Michele Besso, 12 Dec. 1951)


Credits: NASA/DOE/Fermi LAT Collaboration

The lectures will be delivered by
Fulvio Parmigiani
on October
05/10
07/10
12/10
15/10
from 5pm to 6pm
ROOM A Department of Physics

Synopsis

A set of four lectures on the foundation and rise of concepts, physics and mathematical formalisms nowadays used to describe the light quanta, an elusive particle with no mass but subject to gravitation effects, as those predicted by the mathematical singularities (black holes) that emerge from the field equations of the general relativity, from which the photon are trapped.

In the **FIRST LECTURE** I will provide a fresco of the historical and philosophical roots that give rise to the idea of "grains of light". This period will extend from the ancient philosophers to the Newton's Era.

In the **SECOND LECTURE** we will immerse ourselves in the crucible where classical physics evolved into quantum physics and the history of the photon will be our guide to review opposing ideas in comparison and ideological clashes between the giants of physics across the XIX and XX centuries

In the **THIRD LECTURE** we will review the ideas, the experiments, and the formalisms adopted by a crew of physicists who changed the physics of electromagnetic radiation and probably the physics itself, forever. These people range from Einstein, to Fermi, from Dirac/Heisember to von Neuman, till the crucial Compton scattering experiment. We will explore the history and controversies that laid the foundation for what we now call "quantum optics."

In the **LAST LECTURE**, as in the crescendo of a great polyphonic symphony, we will follow, step by step, what today we can define a fundamental mutation of quantum physics born from the head-on collision between two schools of thought on the completeness of quantum mechanics and therefore two ways of understanding physics. What will emerge is a physics bearer of the idea of zero point energy and then the idea of quantum vacuum, explaining the interference and diffraction produced by single particles (massive and massless) violating the principle of space-time superposition so far required to explain these phenomena.