

# **Europass Curriculum Vitae**

## **Personal information**

Surname(s) / First name(s)

## **Occupational field**

**Luongo, Orlando**

**Researcher in Theoretical Cosmology and Quantum Information**

## Scientific activity and developments:

Below, I summarize my principal research fields into four different main topics.

- The investigation and characterization of universe's dynamics by means of thermodynamic quantities such as: entropy, specific heats and so forth in the context of the homogeneous and isotropic universe, whose corresponding effects are deduced from prime principles and may reveal the microphysics behind the net energy-momentum contribution of the universe.
- The study of the well-consolidate model independent technique, named cosmography, capable of discriminating among several extensions of the standard cosmological model, the ones able to reproduce current observational constraints. The use of cosmography may also reveal the correct gravitational theory and well adapts to understanding whether and how the universe expansion history is effectively modified due to possible extended theories of gravity.
- The consequences of investigating space-time symmetries, matching internal with external solutions of particular metrics. This may be used to characterize the dark matter profiles in galaxies and also to provide, under certain circumstances, measurable effects of repulsive gravity. As a consequence, the neutrino oscillations, decays and fluxes may be influenced in the regime of strong gravitational fields. In addition, especially for early phases of the universe evolution, the role played by neutrinos is modified to account the observed structures and their formations.
- The quantum imprinting on how the averaging processes of inhomogeneities would affect large-scale dynamics, leading as back-reaction effects to an effective contribution to the averaged energy-momentum tensor. In such a way, local inhomogeneities may significantly affect the concordance model, since the process of observation would be modified accordingly. In so doing, I investigate the possibility that the universe is spatially inhomogeneous and manifests modifications on the Wheeler deWitt equation, whose solutions drive the early-time cosmology, reproducing furthermore the late-time evidence for dark energy.

In particular, I am greatly interested in the following topics:

1. Cosmography of the observable universe.
2. Thermodynamics aspects of present-time cosmology.
3. Neutrino oscillations and consequences in cosmology.
4. Dark matter profiles in Spiral galaxies.
5. Monte Carlo Analysis.
6. Exact solutions and absolute calculus in General Relativity.
7. Extended theories of gravity.
8. Quantum Gravity and aspects of Information Theory.
9. Effects of quantum cosmology at early times.
10. Entanglement effects in early-phases cosmology.
11. Quantum Field Theory.

## Summary of publications:

1. Total number of scientific works (including papers, proceedings, chapter of books, books, etc.): **58**
2. Total number of citations: **426**
3. h-factor: **14**

(data got from <https://inspirehep.net>

last update: February 2017)

## Education and training

Dates	03/11/2008 – 29/03/2012
Occupation or position held	International PhD in Physics
Main activities and responsibilities	Research in General Relativity and Cosmology
Name and address of employer	University of Rome "La Sapienza", (Italy)
With thesis	Geometrothermodynamics in General Relativity as a tool to describe the Universe dynamics
Supervisor	Prof. Hernando Quevedo
Dates	01/10/2006 – 16/07/2008
Title of qualification awarded	Master Degree in Physics
Principal subjects	Theoretical Physics
Name and type of organization providing education and training	University of Naples "Federico II"
With thesis	L'approccio tomografico in Cosmologia Quantistica
Supervisors	Prof. Salvatore Capozziello, Dr. Cosimo Stornaiolo
Final vote	110/110 cum laude

## Personal skills and competences

Mother tongue(s)

Other language(s)

*Self-assessment*  
*European level<sup>(\*)</sup>*

**English**  
**Spanish**  
**French**

### Italian

Understanding		Speaking		Writing
Listening	Reading	Spoken interaction	Spoken production	
Excellent	Excellent	Excellent	Excellent	Excellent
Excellent	Excellent	Excellent	Excellent	Excellent
Good	Good	Good	Good	Good

<sup>(\*)</sup> Common European Framework of Reference (CEF) level