

# **InDark** (Inflation, Dark Matter and the Large-Scale Structure of the Universe)

## ➤ Line 5, **Astroparticle Physics**.

**At the national level it includes 8 nodes** (Bologna, Ferrara, LNGS, **Padova**, Roma II, Roma III, Torino, Trieste); see <https://web.infn.it/CSN4-new/IS/Linea5/InDark/InDark.html>

**Evaluated as “excellent” in the last evaluation process by the external Referees (October 2016)**

## ➤ **Present composition**

Staff members: Nicola Bartolo (national coordinator), **Daniele Bertacca (new RTDA since March 2018)**  
Michele Liguori, Sabino Matarrese, **Marco Peloso (associate Prof. since May 2018)**,  
Massimo Pietroni

Postdocs: **Angelo Ricciardone (new INFN postdoc, arriving September 2018)**;  
Karagiannis Dionysios (“assegno di Ricerca” since 15/6/2017)

**+ new “assegno di Ricerca” from September 2018, co-funded by INFN for Euclid activities**

PhD Students: Giampaolo Benevento, Alexander Ganz, Filippo Oppizzi, Giorgio Orlando, Andrea Ravenni

## ➤ In the last four years an average of 11 members, with **two INFN postdocs (Frederico Arroja, Andrei Lazanu)**

## ➤ **Main lines of research:**

- Cosmology
- Physics of the early universe (inflation)
- Cosmic Microwave Background (CMB) physics
- Large-Scale Structure (LSS) of the Universe/ Dark Matter
- Tests of fundamental physics via cosmological observables
- Dark energy/modified gravity
- Cosmological inference from gravitational waves

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- **Highlights of some of the main scientific results achieved in the last 4 years**
  - Most precise constraints **on primordial non-Gaussianity from inflation** (one of the most efficient tools to discriminate among competing inflation models for the early universe) and on **inflation models** achieved within *Planck* collaboration
  - Investigations of new observational probes, new statistical estimators, and forecasts to constrain non-Gaussianity via CMB and LSS surveys (e.g. **CMB spectral distortions – white paper in preparation-bispectrum of dark matter and galaxies, and the so-called “scale-dependent halo bias”**)
  - Investigations of new classes of **modified gravity models**
  - Renormalization group techniques to study **non-linear evolution of cosmological dark matter perturb.**
  - **Cosmological inference from gravitational waves:** first complete computation of effects of cosm. inhomogeneities on the propagation of GWs; Gws from inflation: e.g., first computation of 3-point correlation functions of interferometric signals of a stochastic background of gravitational waves
- **Publications in the last four years:** 134 publications present in the INFN database.
- **Participation to International collaborations:**
  - some of us (N.B., M.L., S.M.) are **Planck** scientists and Core Team members of the *Planck* satellite collaboration
  - members of the **Euclid** satellite collaboration
  - members of the “cosmology” and “tests of fundamental physics” WG of **LISA (we have successfully applied to being part of the LISA collaboration; Angelo Ricciardone and Marco Peloso asked to be core team members).**
  - **contributors to** the Science Case WG for the proposal of a future ESA space mission (**CORE**) to measure inflationary gravitational waves via CMB polarization

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INDARK

Preventivi 2019 > CSN IV > Sommario di INDARK > Padova > Modulo EC/EN 7

Modulo EC/EN 7

A cura di: NICOLA BARTOLO

Ricercatori						
	Nome	Età	Contratto	Qualifica	Aff.	%
1	Bartolo Nicola		Associato	Prof. Associato	CSN IV	90
2	Benevento Giampaolo		Associato	Dottorando	CSN IV	100
3	Bertacca Daniele		Associato	Ricercatore Tempo Determinato Tipo A	CSN IV	90
4	Karagiannis Dionysios		Dipendente	Assegnista	CSN IV	90
5	Lazanu Andrei		Dipendente	Borse post doc stranieri	CSN IV	100
6	Liguori Michele		Associato	Ricercatore	CSN IV	90
7	Matarrese Sabino		Associato	Prof. Ordinario	CSN IV	90
8	Oppizzi Filippo		Associato	Dottorando	CSN IV	100
9	Orlando Giorgio		Associato	Dottorando	CSN IV	100
10	Peloso Marco		Associato	Prof. Associato	CSN IV	30
11	Pietroni Massimo		Associato	Prof. Ordinario	CSN IV	40
12	Ravenni Andrea		Associato	Dottorando	CSN IV	100
13	Ricciardone Angelo		Dipendente	Borse post doc stranieri	CSN IV	100
<b>Numero Totale Ricercatori</b>					13	FTE: 11.2

- ***Request for 2019: 16k euro. In line with previous years.***
- Through the years we have exploited the funds available for inviting guests to start new scientific projects (on average 2 guests every year)
- ***In the last two years a fruitful interaction developed between various members of our InDark group and the “Euclid” exp. in Gr. II***  
***Also we have expressed interest in contributing to some of the activities of the new “ET” experiment in Gr. II***