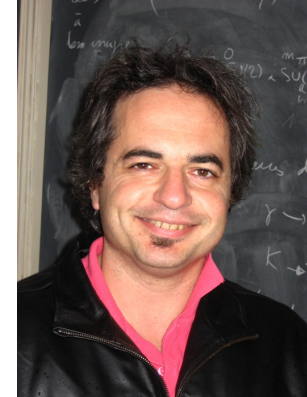


Cosmology and Gravitation group

Permanent members:

- Eugeny Babichev (CR)
- Christos Charmousis (DR)
- Renaud Parentani (PR)
- Bartjan van Tent (MC)



Enrico Fermi fellow:

- Alessandro Fabbri



PhD students:

- Florent Michel (Parentani)
- Gabriel Jung (van Tent)
- Antoine Lehebel (Charmousis)

Le



Postdoc:

- Scott Robertson



TOPICS

- Modification of Gravity (Babichev, Charmousis)
- CMB physics (van Tent)
- Classical and quantum aspects of black holes (Babichev, Charmousis, Fabbri, Parentani)
- Primordial Universe (Parentani, van Tent)

Modification of gravity

Why modify gravity? Explain acceleration of the Universe, Inflation, Quantise gravity, Field theoretical interest.

Extra scalar degree of freedom in gravity

- Brans-Dicke theory \Rightarrow more generic scalar tensor theories
- Galileons, k-mouflage gravity

Modification of some basic principles

- Give up Lorentz invariance. Lorentz violating theory in UV (helps for quantization of the graviton)

Mechanism to restore General Relativity locally

- Vainshtein mechanism
- Chameleon mechanism

Classical and quantum aspects of black holes

Quantum aspects (Parentani, Fabbri)

- Hawking radiation in Lorentz Violating models
- Analogue black holes and white holes in condense matter

Classical aspects (Babichev, Charmousis)

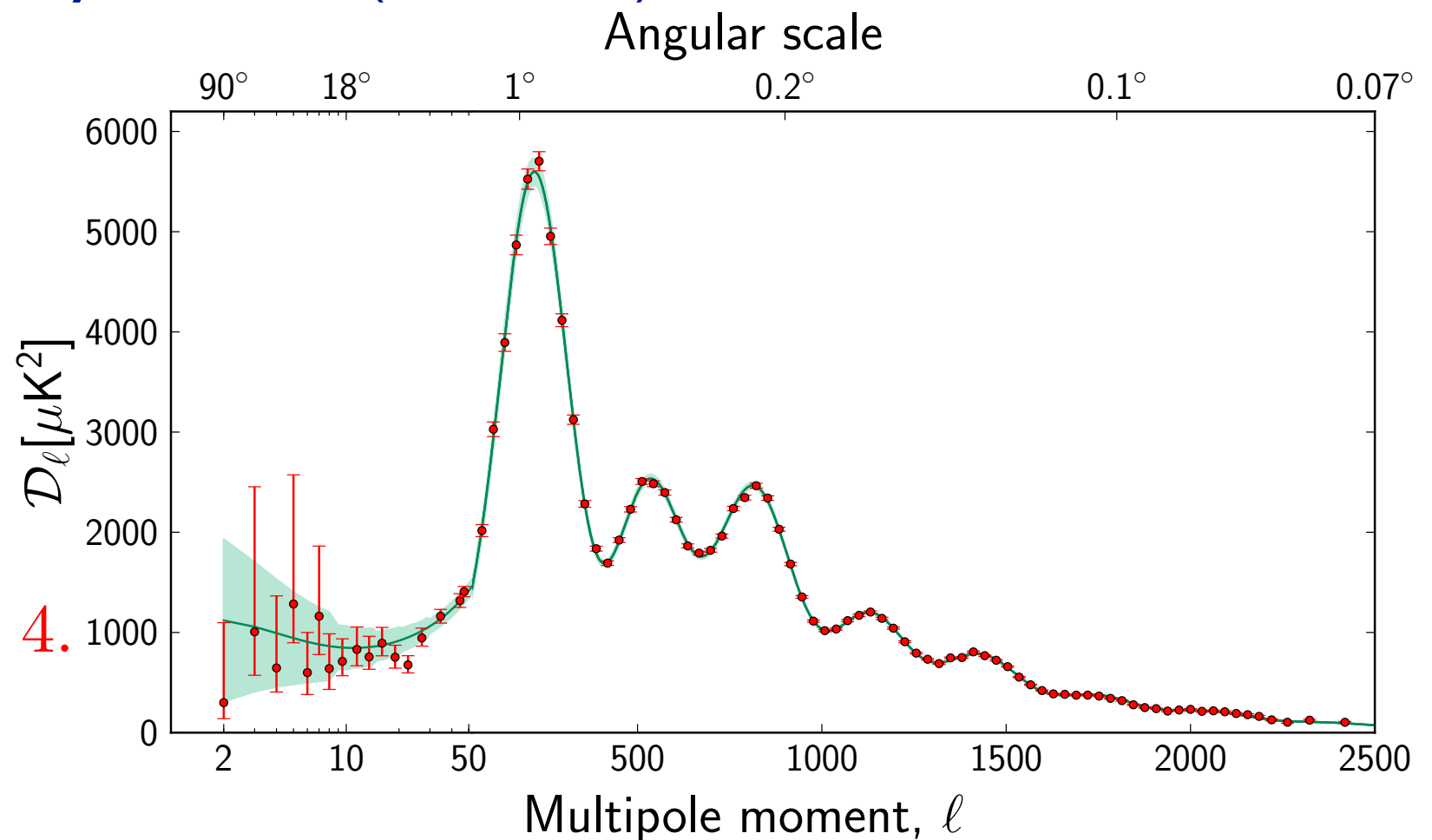
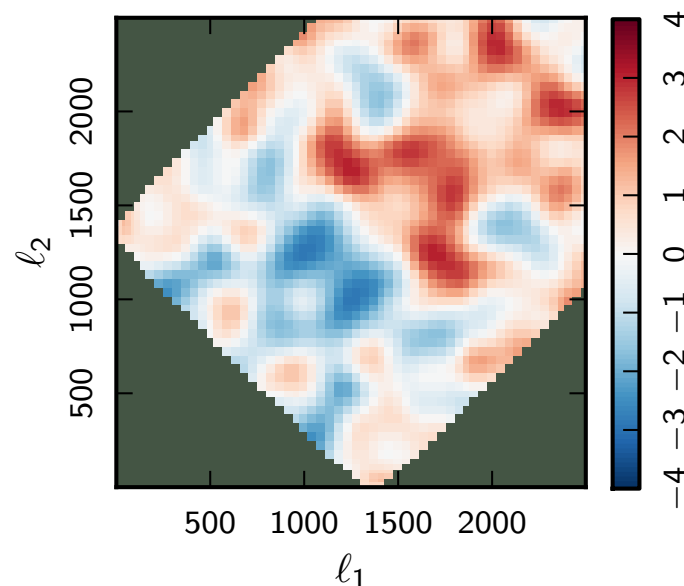
- Black holes in higher dimensions: exact and approximate analytical methods
- Black holes in anti-de Sitter and AdS/CFT applications
- Black hole solutions in the galileon model
- Black holes in massive gravity and their stability

CMB Physics

Non-gaussianities in the CMB spectrum:
distinguish different inflationary models (Van Tent)

- Linearized fluctuations ($\Phi_L \sim 10^{-5}$): gaussian spectrum
- Non-linear corrections (Non-gaussianities)

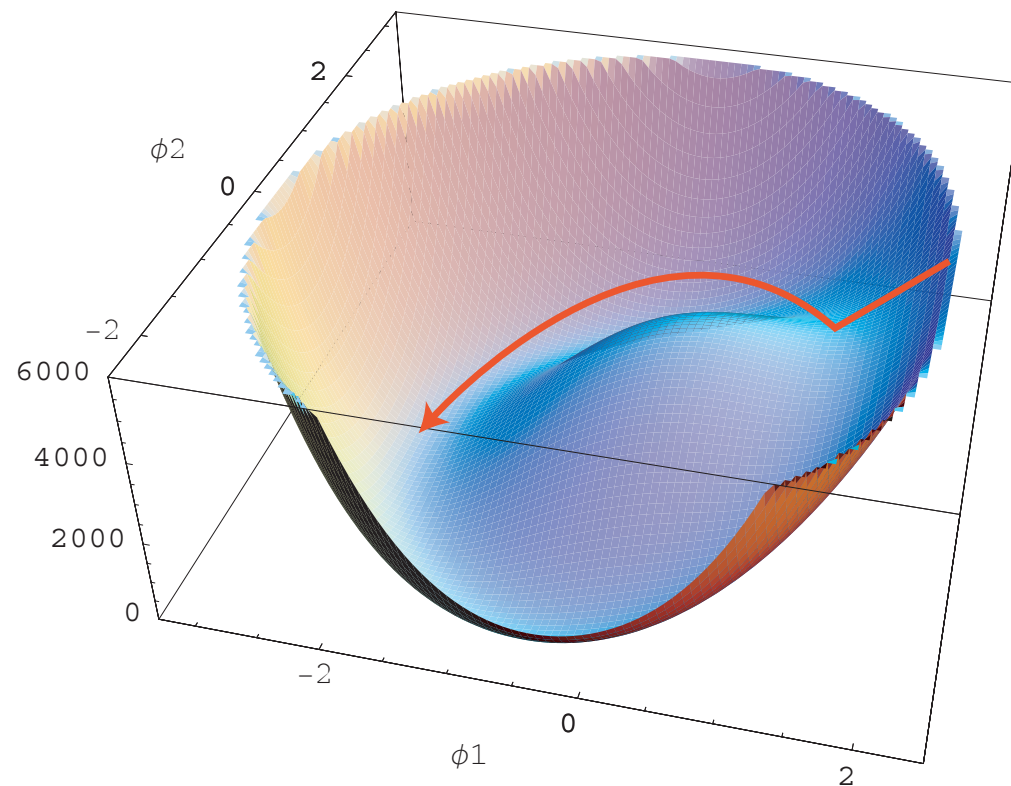
$$f_{NL} = 2.7 \pm 5.8, \quad \delta_{NL} \sim 4.$$



Primordial universe

Perturbations in various inflation models:

- Non-gaussianities in multi-field inflation models (Van Tent)



QFT on de Sitter space (Parentani)