

A large blue telescope is shown in the foreground, pointing towards a vast field of stars and galaxies in the background. The telescope's structure is complex, with various lenses and mirrors visible. The background is a rich, multi-colored field of stars, with a prominent red and purple nebula-like glow in the center. The overall scene is set against a dark, star-filled sky.

Astro/Cosmo/Gravity Group

TH Retreat
2014

People

Staff



Sergey Sibiryakov
(EPFL/CERN)



Diego Blas



Julien Lesgourgues
(to Aachen in April)

Fellows



Pedro Schwaller



Matthew McCullough



Mathias Garny



Camille Bonvin



Dani Figueroa
(joins in Jan)

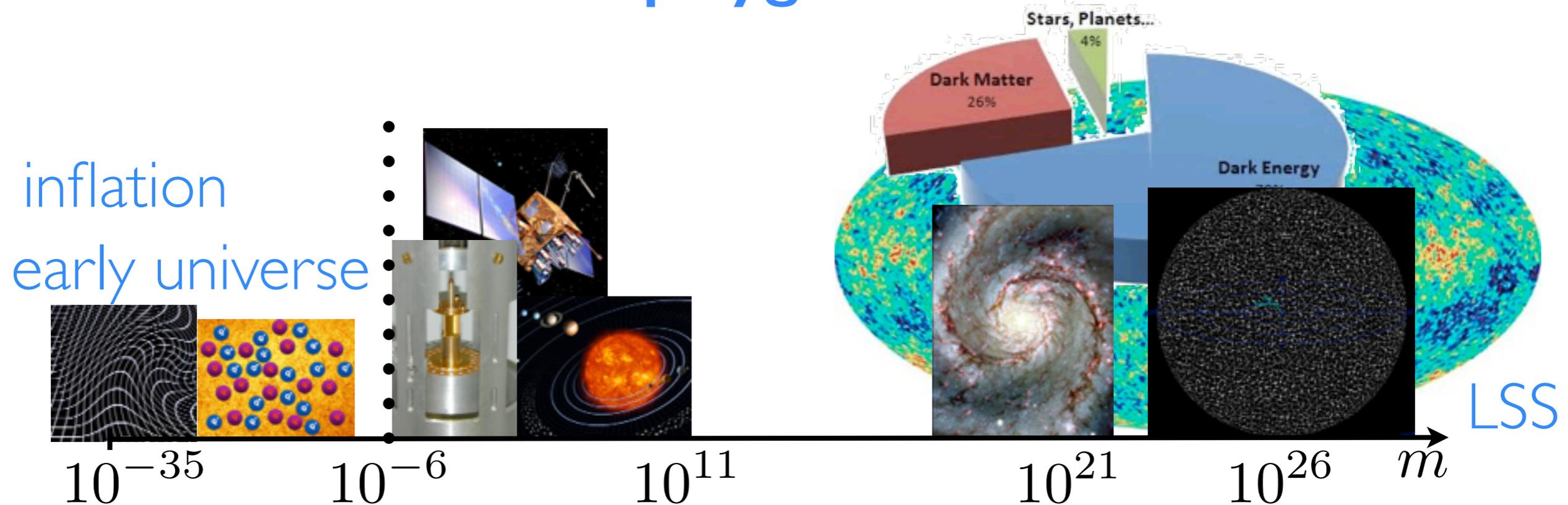


Subodh Patil
(to Geneva in March)



Jan Hamann
(to Australia in Jan)

Our playground



successfully described by the standard paradigm: Λ CDM
General Relativity + CDM + Inflation

Extra efforts required from:

theory! (QG/Inflation, Cosmological constant, BAU, DM modelling, LSS...)

data! Cosmology/Gravity/DMdet is a precision science! (Astro improving)
and we are NOT ready for the forthcoming data

(e.g. cosmological observations constrain GR at the same level as
binary pulsar test!)

Interests (big menu)

late cosmology

Dark matter **properties**

dark matter

Dark matter **self-interactions**

Neutrinos in cosmology

Dark matter **models**

Codes for cosmic microwave background
or structure formation (clusters)

Composite DM

Direct and **indirect** detection

Cosmological **structure formation**

Astrophysical aspects
(e.g. **spectral** lines)

Dark energy theory and tests

Euclid and **Planck** satellites

early universe

gravity

eLISA

Leptogenesis, baryogenesis, non-equilibrium

Modified gravity: solar system,
stars, gravitational waves, cosmology

Primordial **magnetic fields**

Theories **without Lorentz invariance**

Inflation: theory, tests, robustness

Emergence of space-time

Primordial **gravitational waves**

High energy **scattering** of gravitons

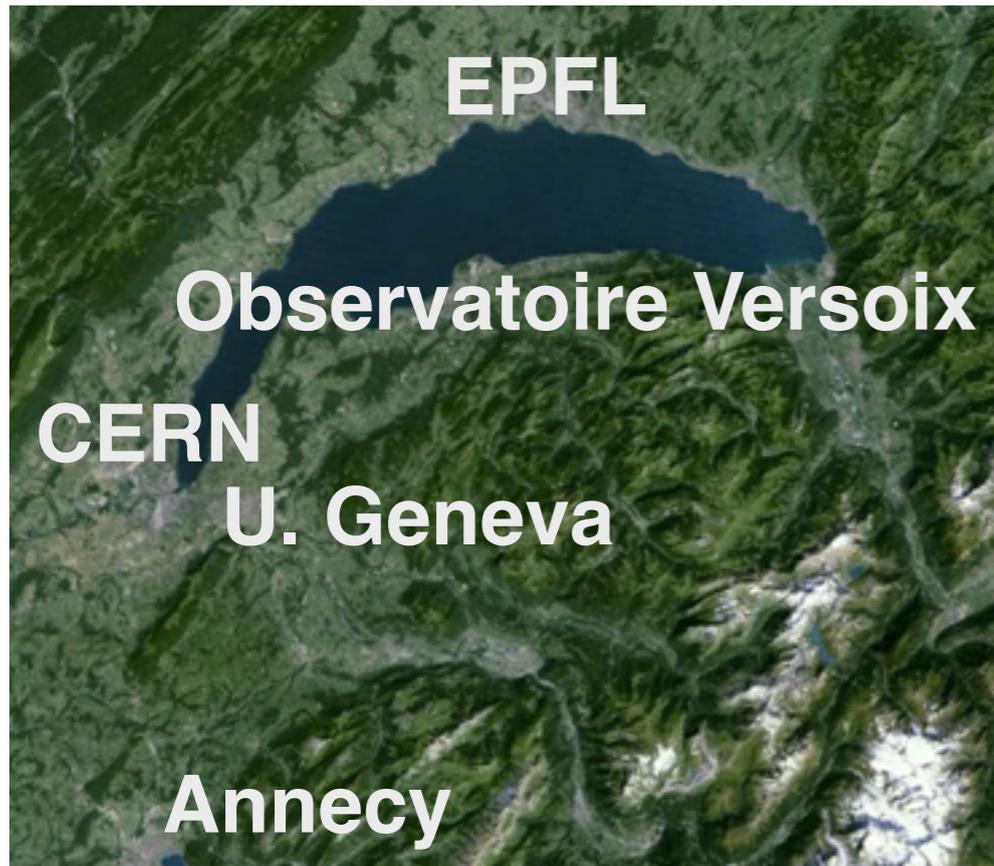
Cosmic strings

Activities



CosmoCoffee Weds@11:30

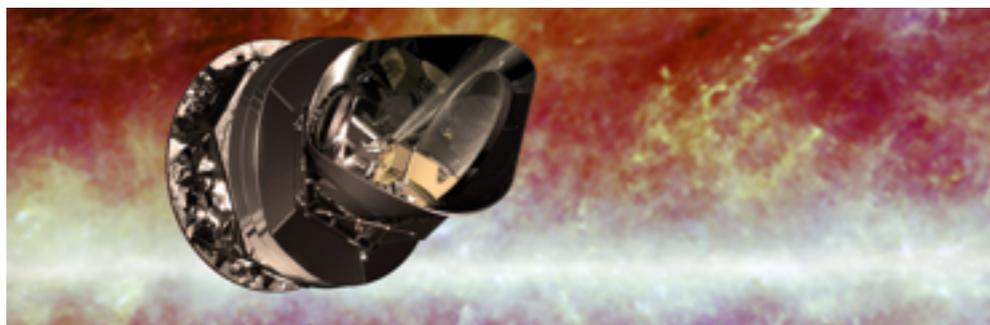
Informal seminar on
Astro/Cosmo/Gravity



ECU Meetings

Every month and 1/2 (28th Nov)

Joint journal-club with
different Astro/Cosmo/Gravity
groups around Lake Léman



TH-Institute (6th-16th Jan 15)

”Understanding the early Universe”

Leaving soon (but not yet!)



Julien Lesgourgues (to Aachen in April)

Cosmological model building and confrontation with data.

Developer of public numerical tools.

Focus on Neutrino in Cosmology (also DM and DE).

Member of Planck satellite (CMB) and Euclid satellite (LSS).



Subodh Patil (to Geneva in March)

Effective field theory on time dependent backgrounds.

Inflation and its phenomenology.

Correlation functions to prove cosmological standard model.



Jan Hamann (to Australia in January)

Cosmological model building and confrontation with data.

Inflation, DM, DE signatures on cosmology.

Focus on search for features in inflation spectrum & neutrinos.

Member of Planck satellite (CMB).

Coming soon (now in Columbia U.)

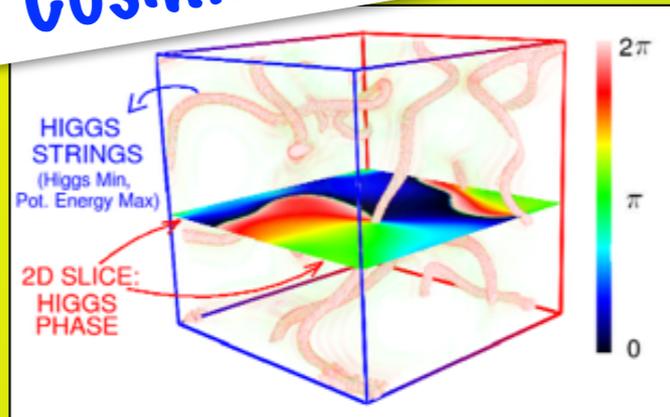


DANIEL G. FIGUEROA
(From Jan. 2015 @ CERN)

What do I do ?

**Non-Equilibrium
Early Universe
phenomena !!!**

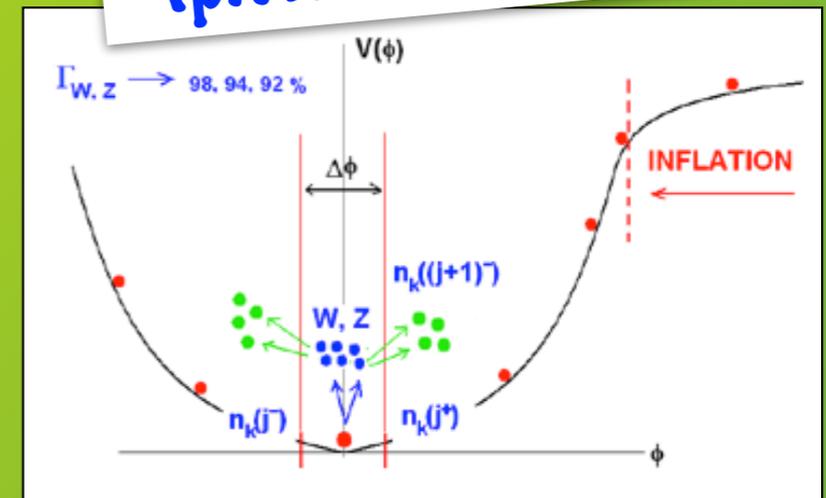
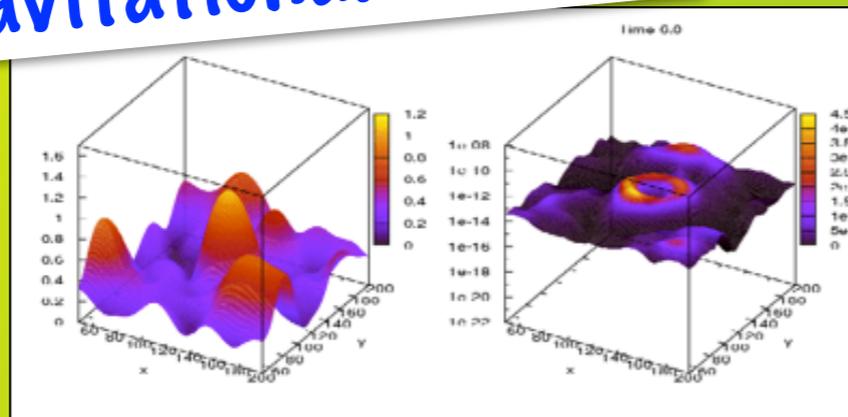
Cosmic Strings !



SM Higgs + Inflation

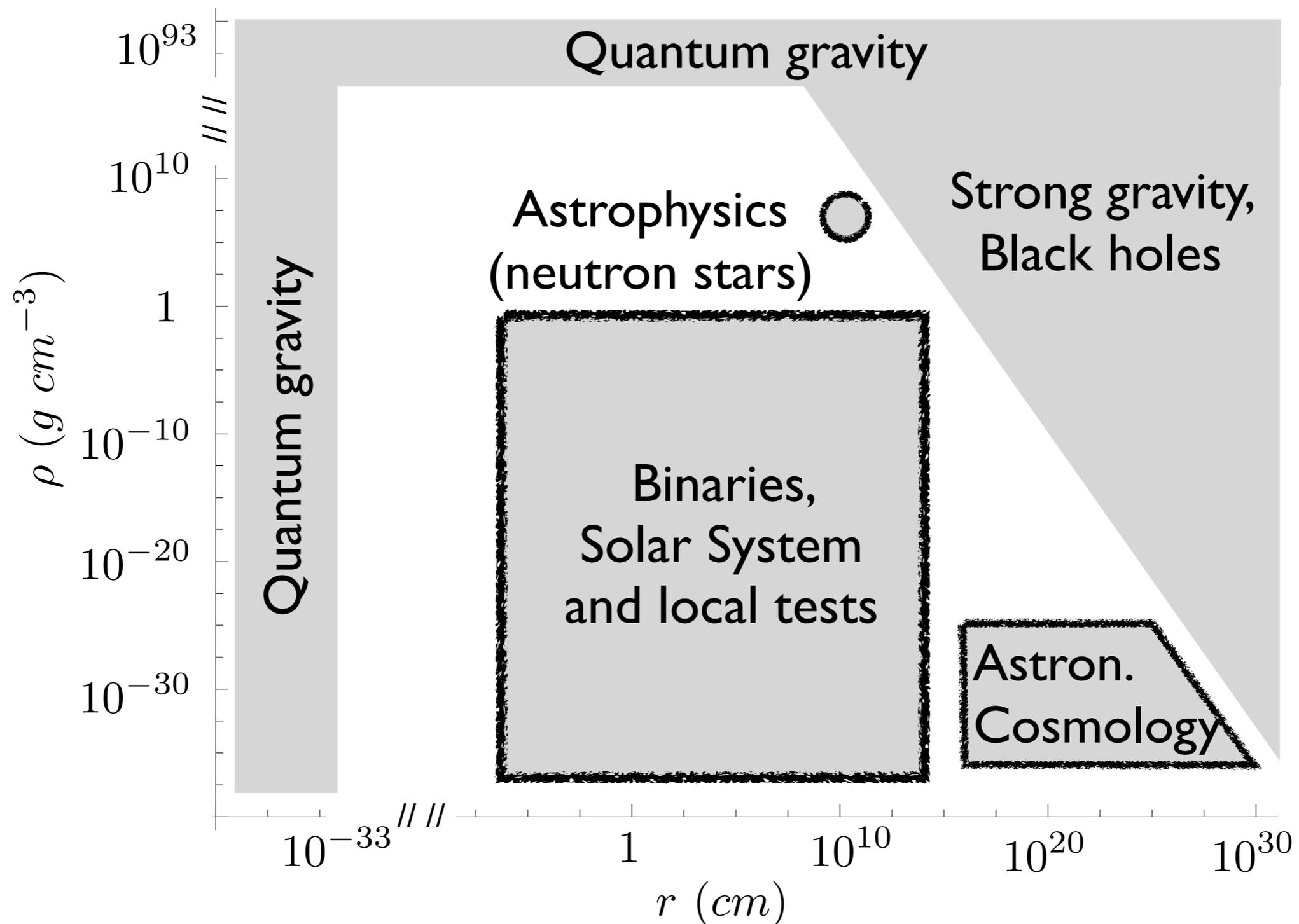
(p)Reheating !!!

Gravitational Waves !!



+ Visitors: R. Scoccimarro, F. Vernizzi, F. Bezrukov, C. Burgess, ...

Myself: I play with gravity at different scales



post-Newtonian physics, gravity waves from binaries, dark matter, dark energy, cosmological perturbation theory, black holes, massive gravity, (quantum) gravity w/o Lorentz invariance