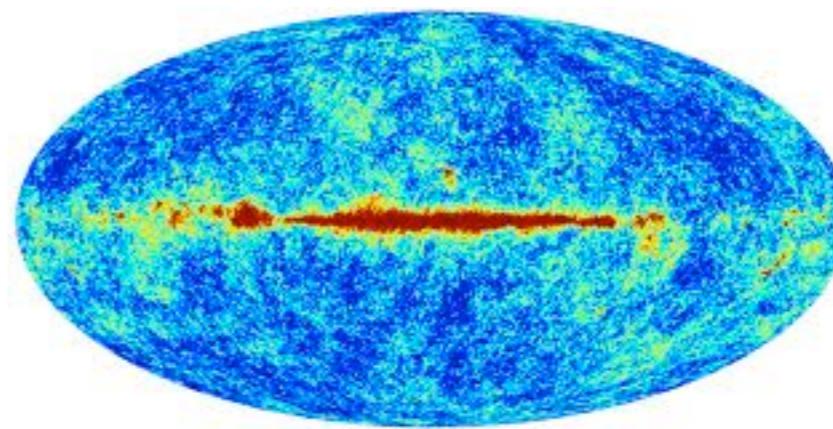
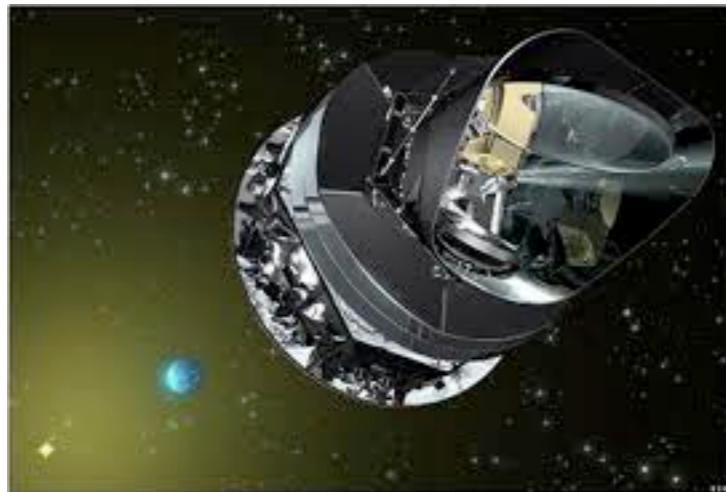


Leonardo Senatore

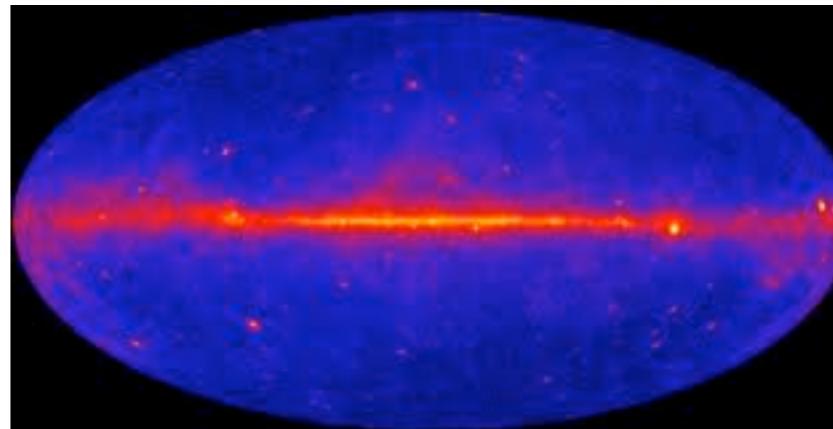
COSMO/ASTRO at th-CERN

Great Times for COSMO/ASTRO

- Plank Satellite (CERN theory institute in June!)



- FERMI satellite



Who are we?

- Staff



G. Servant



J. Lesgourges



L. Senatore

+ BSM staff

- Fellows



A. De Simone

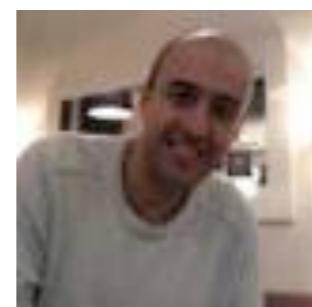
D. Blas

J. Hamann

S. Patil

A. Vikman

- Associates



R. Jimenez

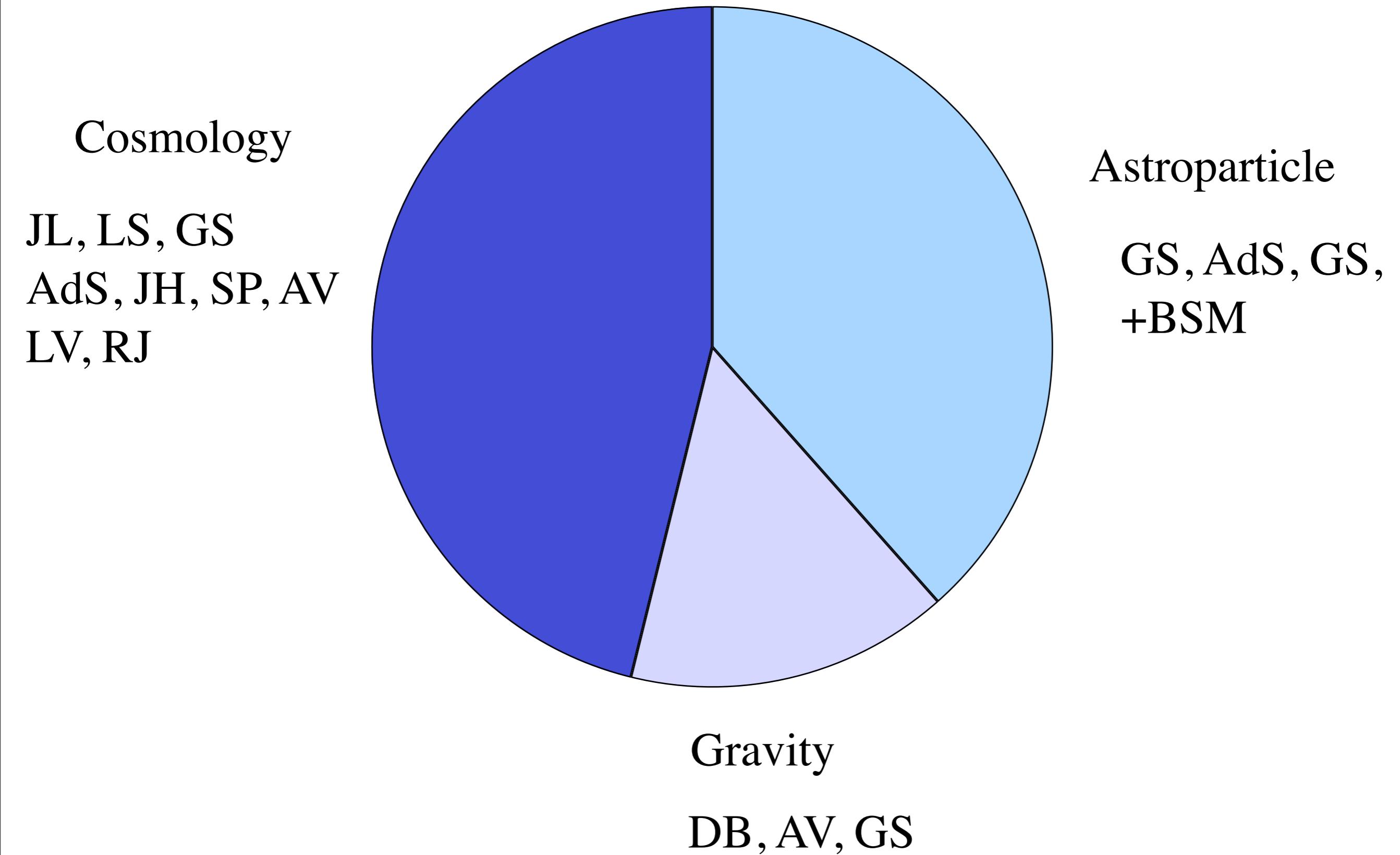


L. Verde



G. Starkann

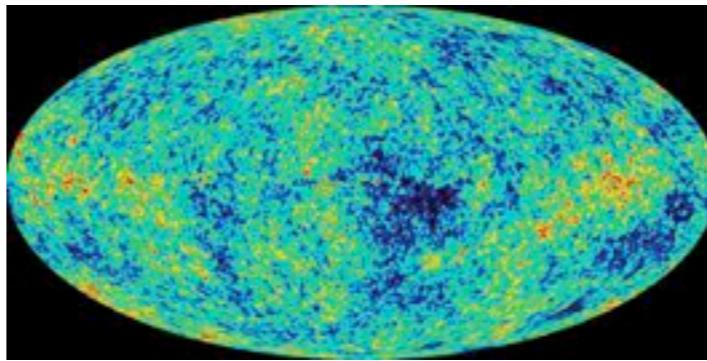
What do we do?



Cosmology Side

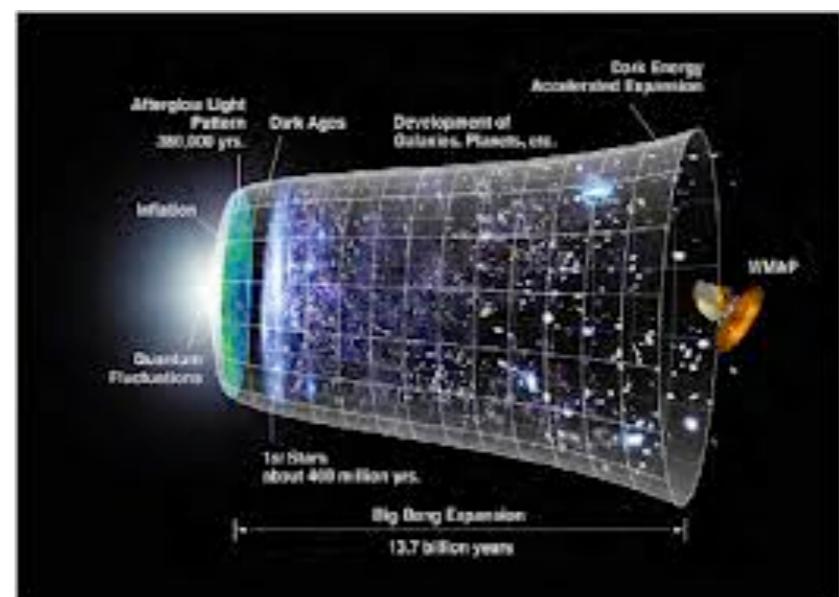
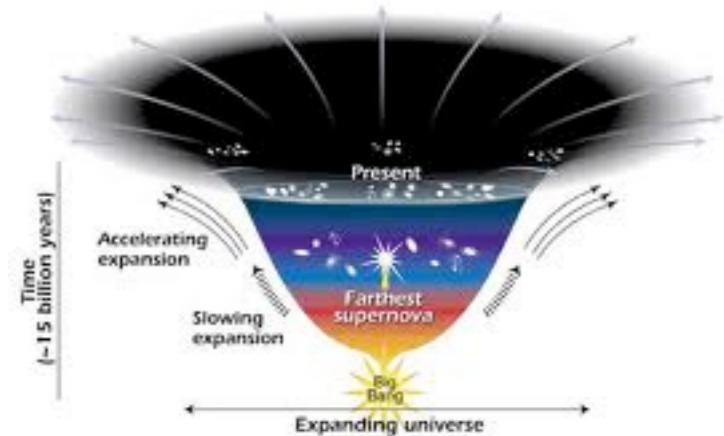
- Data driven subject

- 2 Nobel prize in last 6 years:
 - 2006 CMB,
 - 2011 Acceleration of universe
 - to LBL, a lab like CERN



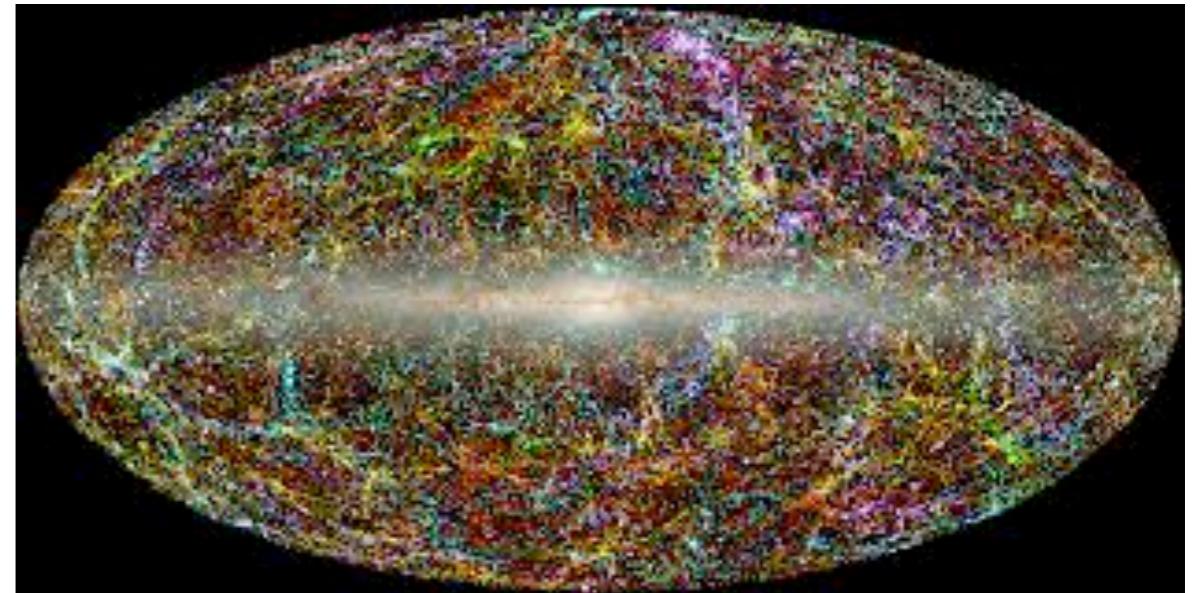
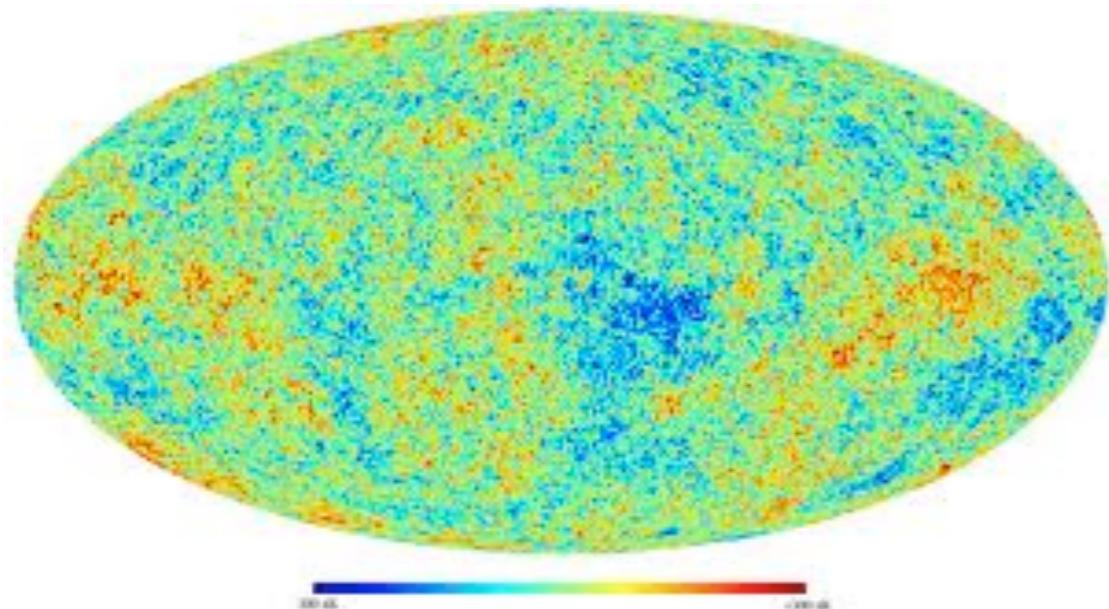
- Theory driven subject

- 2 Fundamental Physics prize in 2012:
 - A. Guth and A. Linde for Inflation



Cosmology: Experimental Situation

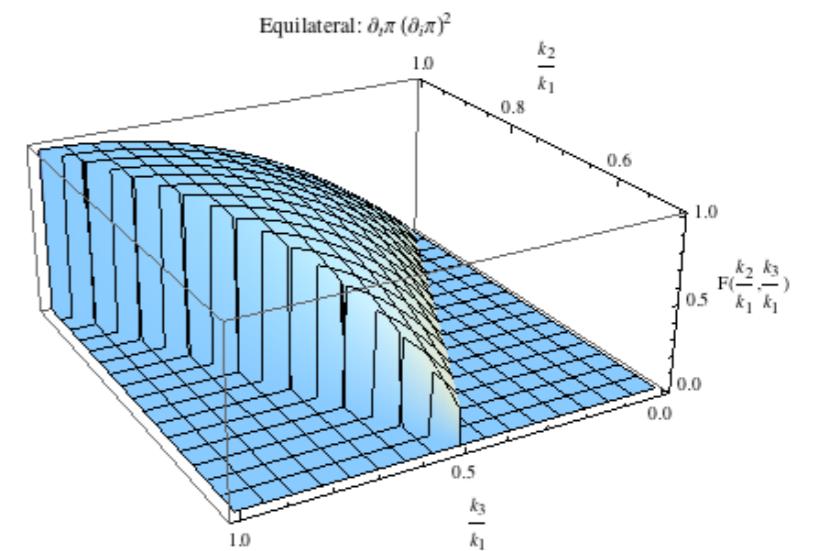
- Several Generation of Experiments
 - Both CMB and Large Scale Structures



- 1992-2003: COBE, Boomerang, Supernovae, ... :
- 2003-2012: WMAP, SDSS
- 2012: Planck, DES, ...
- 2020: Euclid,... 21cm...

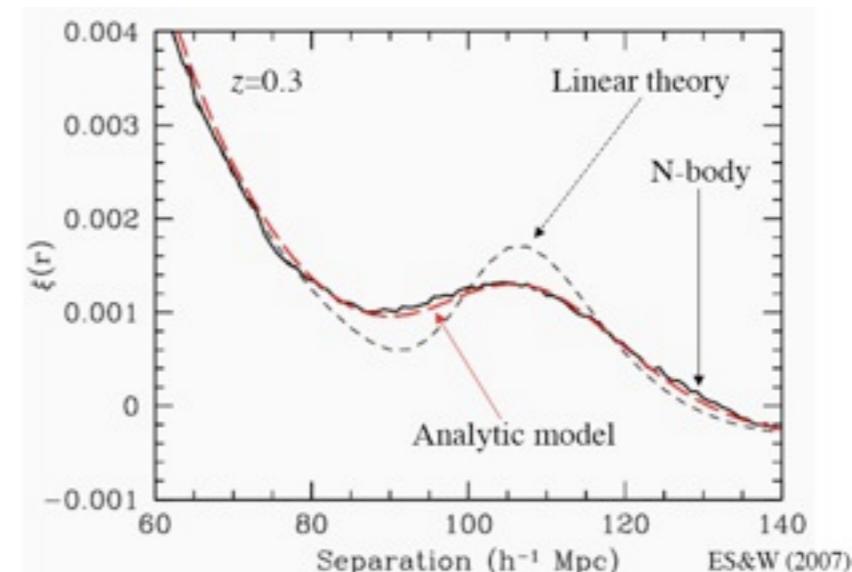
Cosmology: Theory Situation

- Cosmology is ready for interactions
 - Becoming sensitive to non-linear effects
 - Both for Theoretical Models
 - and for data interpretation
- Early Universe Theory
 - Inflation
 - Non-Gaussianities



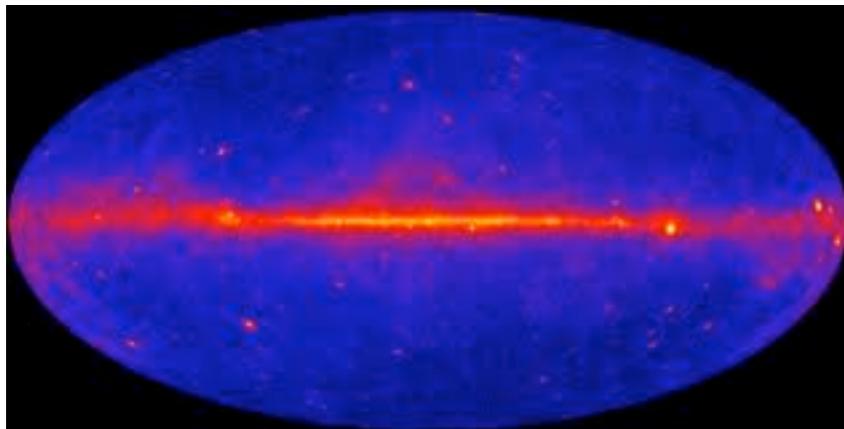
$$S_\pi = \int d^4x \sqrt{-g} \left[M_{\text{Pl}}^2 \dot{H} (\dot{\pi}^2 - (\partial_i \pi)^2) + M_2^4 (\dot{\pi}^2 + \dot{\pi}^3 - \dot{\pi} (\partial_i \pi)^2) - M_3^4 \dot{\pi}^3 + \dots \right]$$

- Dark Energy model building
- non-linearities in dark matter clustering

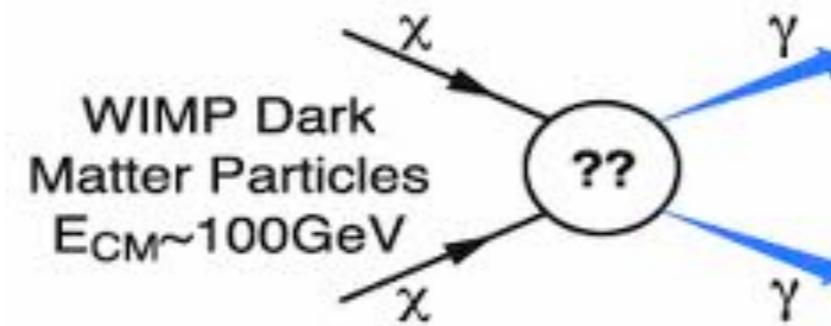


Astroparticle

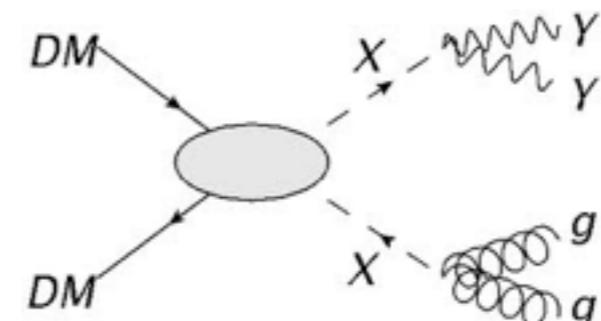
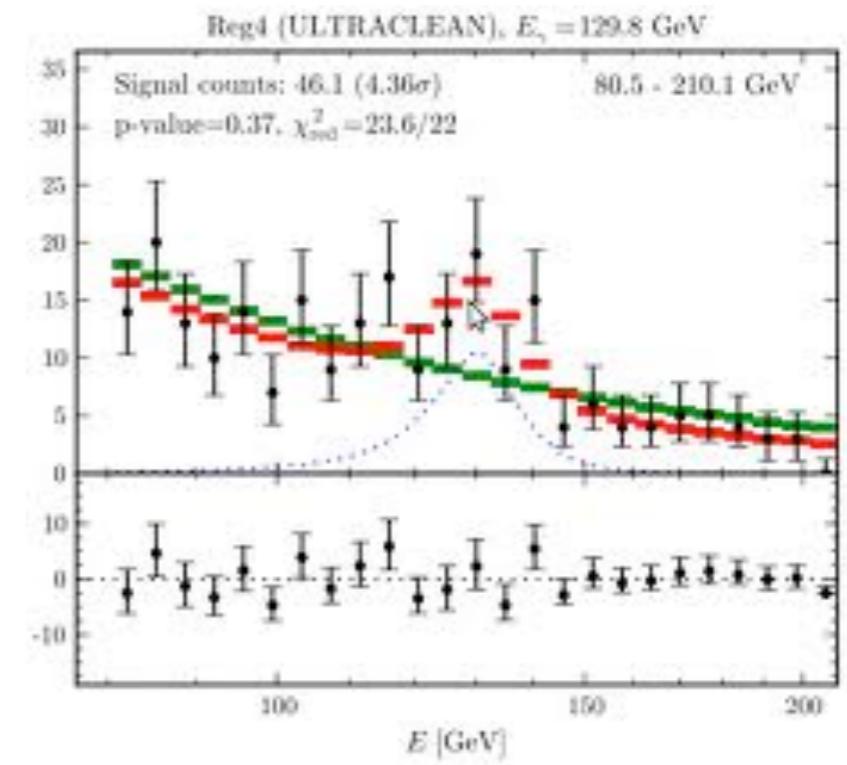
- Experimental:
 - FERMI Gamma-ray telescope



- A tentative line



- Improved data analysis
- Dark Matter Model Building and signals
- Astro-signal understanding
- Baryogenesis



Gravity

- Can one modify gravity?
 - consistently?
- Can one make gravity renormalizable
 - Horava gravity
 - Classicalization
- Study general consequences of breaking Lorentz invariance

Activities

- June: CERN theory institute on Planck data!
- Every Wednesday: Cosmo coffee: an informal seminar
- Wednesday theory colloquium: December Cosmo Domination!
 - Dec 5: Licia Verde
 - Dec. 12: Me
- Once a month: Geneva Area Cosmology meeting:
 - try to gather cosmo-people from
 - CERN
 - Geneva Theory
 - Geneva Astro
 - Lausanne Theory
 - Lausanne Astro
 - Cosmology is great! Please come to our meetings!