

# Summary of cosmology session

Group science cases into larger topics

selected five topics

In each topic there are several more specific science cases

17 possible cases identified

assigned names to people with the expertise for each science case (total of 13 science cases)

tried to define the requirements from each science case (8 science cases – reminder to be done in the coming days)

## Cosmological parameters

dark matter, dark energy, expansion history

## First light

primordial galaxies. first objects, identify sources responsible for ionising the universe, primordial chemical enrichment, first molecules

## Cosmic Web

observe the build-up of the large scale structure, observe the clumping of the gas

## Evolution of galaxies

determine the star formation rate as function of age of the universe, mass assembly, chemical evolution

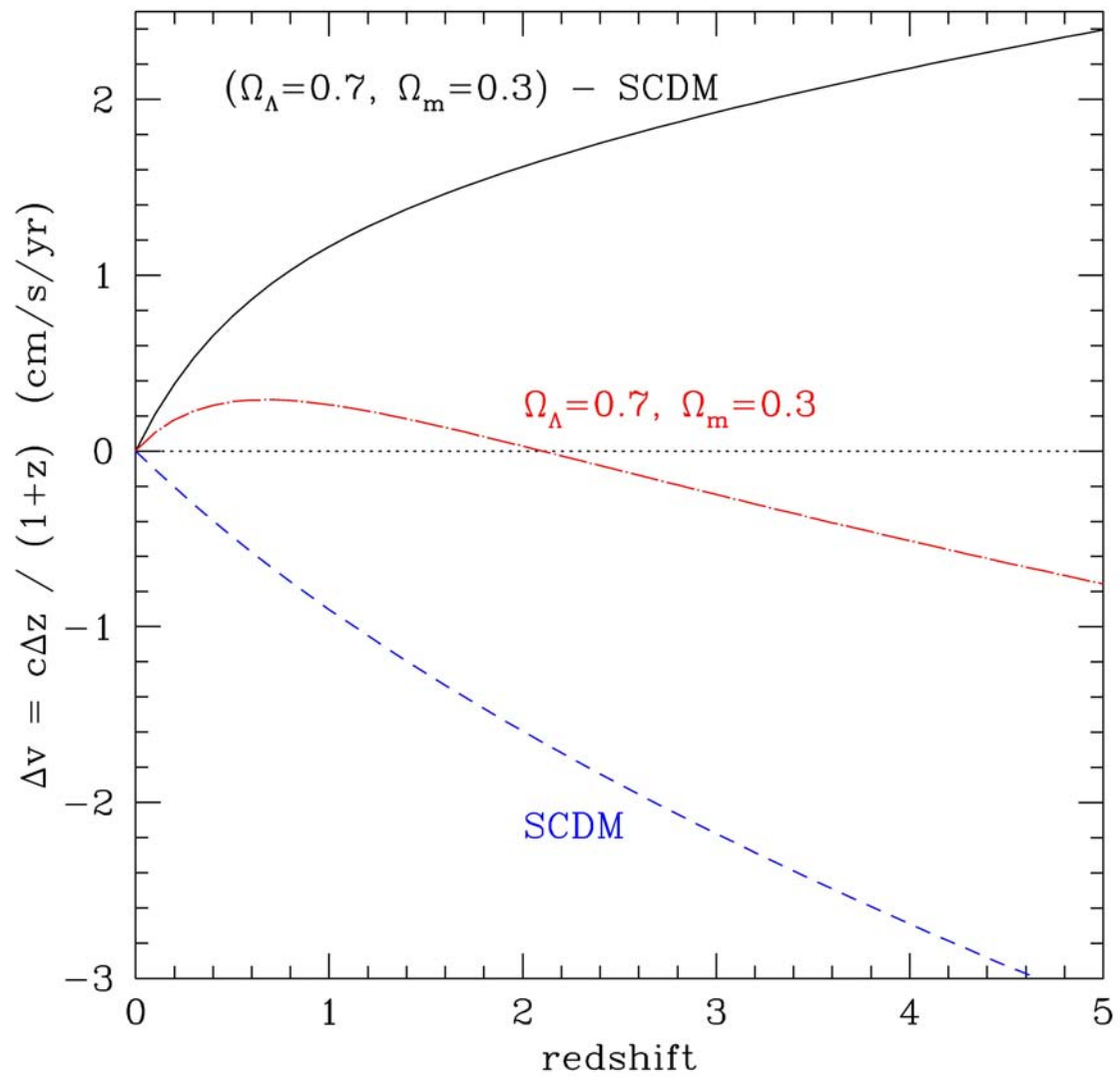
## Fundamental physics

Changing fundamental constants?, theory of gravity, particle masses, exotic matter

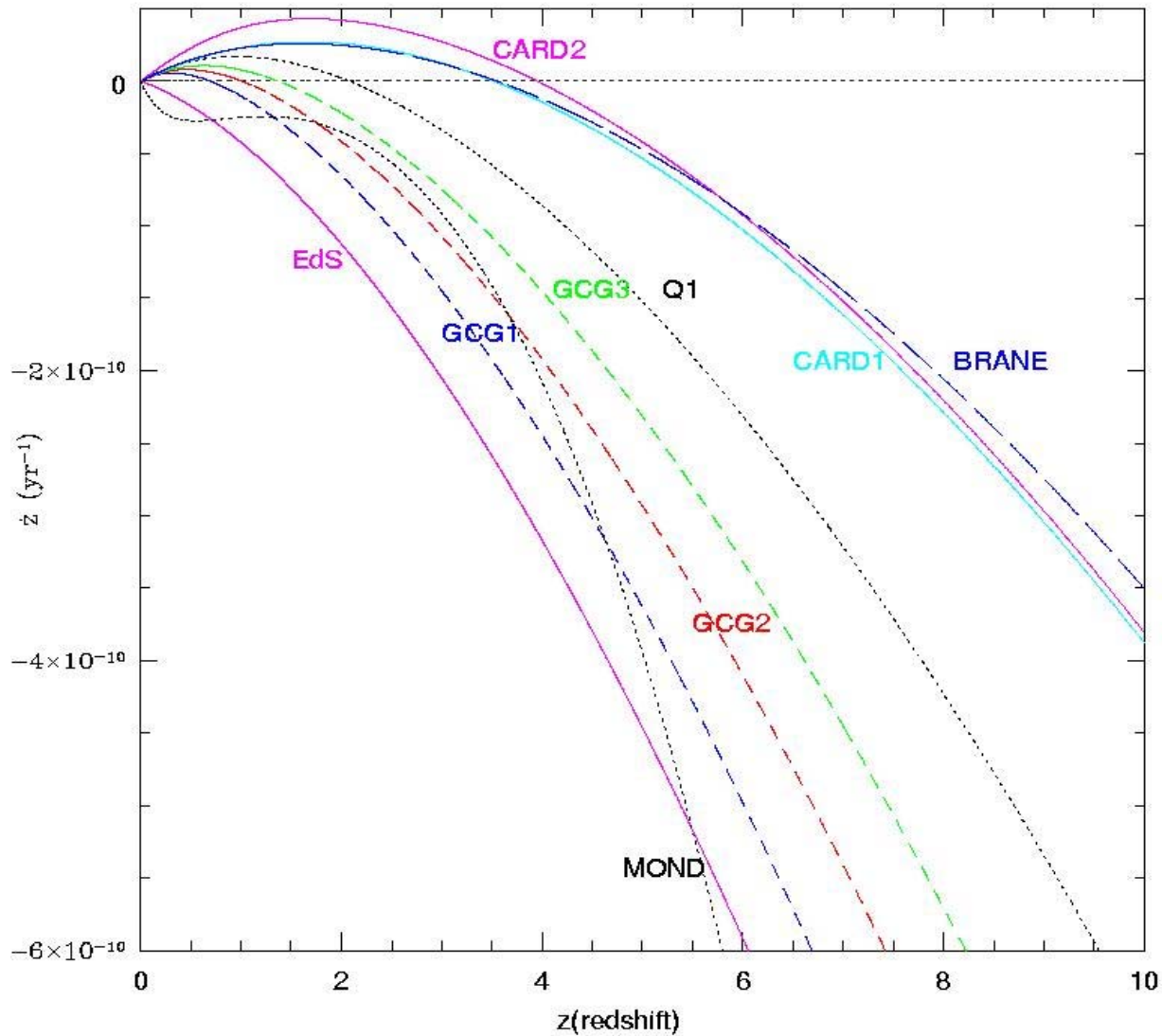
**Paolo Molaro**

## **With CODEX we want**

- ❖ to revisit the possibility of a direct measurement of the cosmic acceleration  $2 < z < 5$ , by using Ly  $\alpha$  forest (or other absorptions) over a long time baseline (10 years or more)**
- ❖ to identify an experiment to carry out at OWL (instrument, strategy, analysis, costs ....)**



# ALTERNATIVE COSMOLOGICAL MODELS



# **Direct measurement**

- **Bias-free determination of cosmological parameters**
- **Different redshift (CMB )**
- **Not dependent from evolutionary effects of sources (SNIa)**

# Key Problems

**Can we built such an instrument ?**

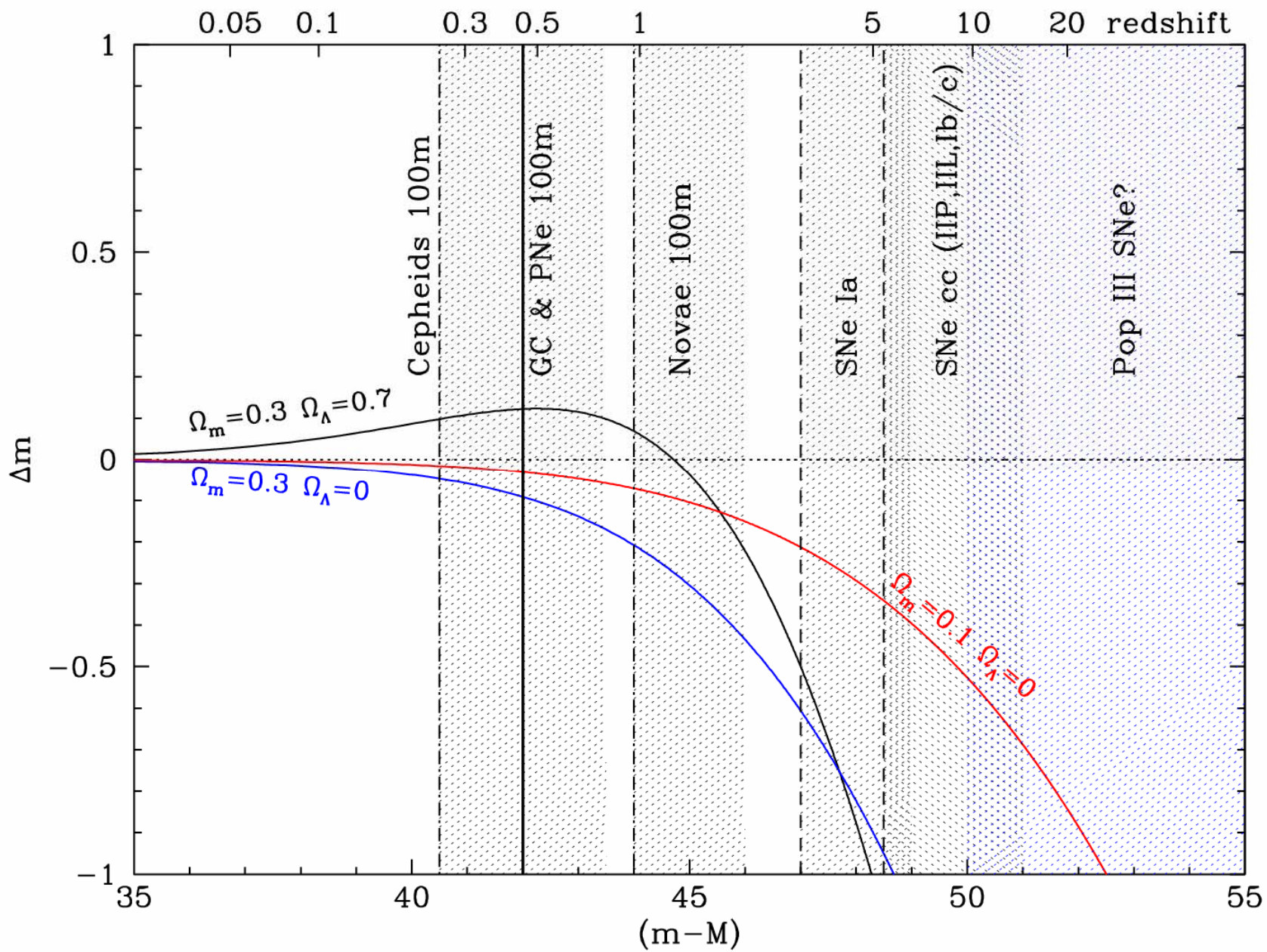
- stability on timescale of 1-10 years

**Can we control the systematics?**

- earth rotation , revolution around the Sun (limit the exposures, need for an ELT)
- sun motion around our Galaxy
- peculiar motions of sources

**Do we have enough photons to recover the signal?**

- Loeb (1998): 0.1 m/s with 2 times 100 QSOs with Keck/HIRES
- however, a significant fraction of OWL nights (50n/year?)





# Requirements

At the moment should be taken very carefully  
as not a full assessment has been made

## FOV

largish for 'survey' type of work (up to 10'x10')  
several cases with single objects

## image quality

0.1" sometimes sufficient (in connection with  
IFUs)

diffraction limit required for many applications

## spectral resolution

'broad-band' ( $R=5$ ) to  $R=400000$

# Requirements (cont.)

wavelength range

- optical for several cases

- near-IR for most high-z cases

observation type

- many cases for single-object spectroscopy

- some ‘survey-type’ cases with multi-object (IFU) spectroscopy

- imaging

competition

- several cases okay with 30m (or 50m)

- some cases clearly in competition with JWST