



# Testing gravity at cosmological scales

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*General Fellini Meeting - Roma*

# The standard cosmological model ( $\Lambda$ CDM)



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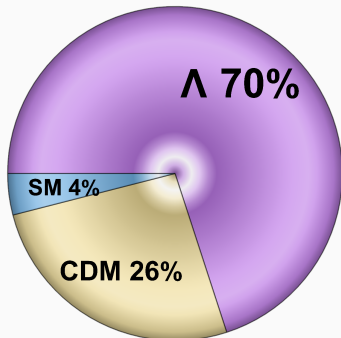
$$\text{GR} + \Lambda + \text{CDM} + \text{SM}$$



Gravity



Ingredients



- 96% unknown!
- $\Lambda$ : accelerating universe
- CDM: more matter than observed
- SM: standard model particles

# How to put gravity on trial?

$$\text{GR} + \Lambda$$

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Efficient theoretical  
framework



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Comparison  
with data



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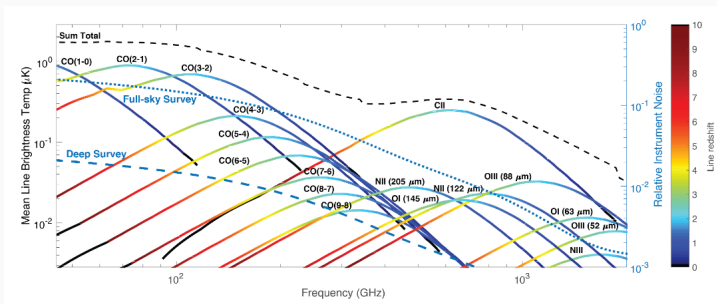
Comparison  
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Different  
regimes (e.g. GW)

# Probing Dark Energy with LIM

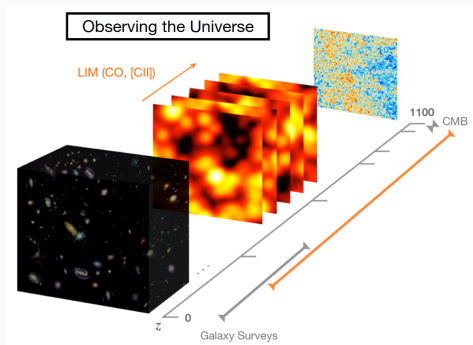
## Line Intensity Mapping (LIM)

Emerging approach to survey the Universe, using relatively low-aperture instruments to scan large portions of the sky and collect the total spectral-line emission from galaxies and the intergalactic medium



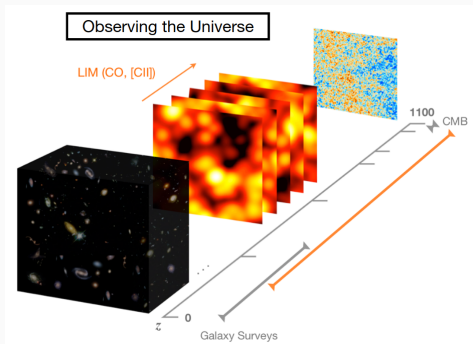
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- [CII]: Ionized Carbon

# Probing Dark Energy with LIM



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# Probing Dark Energy with LIM



- cheap
- low-resolution
- deeper than galaxy surveys
- complementary to galaxy surveys and CMB
- more linear than galaxy surveys (easier for MG)
- CO: Carbon Monoxide
- [CII]: Ionized Carbon

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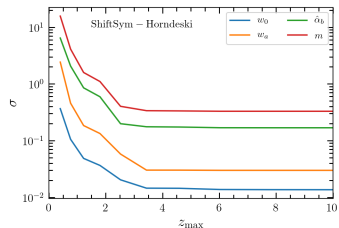
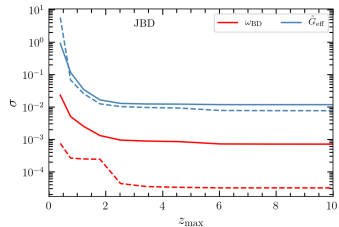
## Scanned many models:

- Early dark energy
- Late dark energy
- Classical models
- Complete models
- Ad-hoc models

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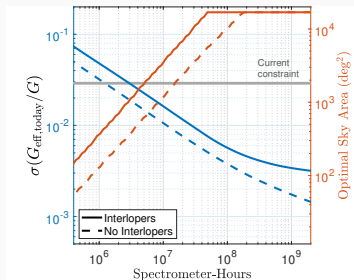
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summarized in spectrometer-hours (“effort level” of an experiment)

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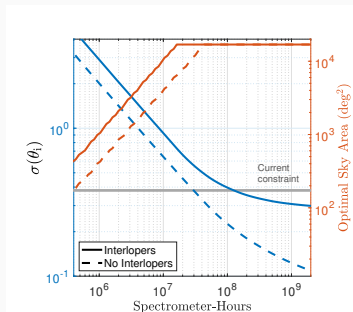
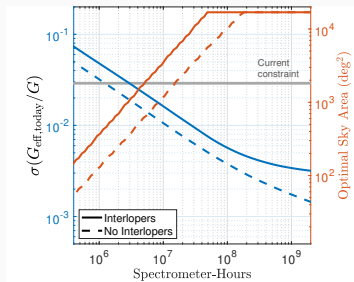




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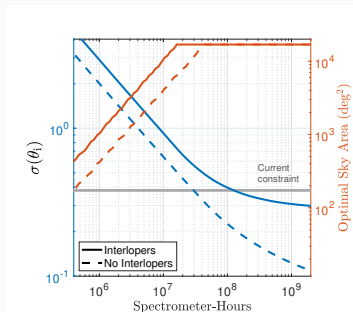
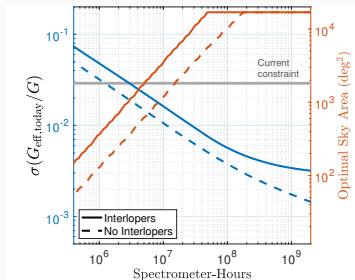
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# Probing Dark Energy with LIM

## Survey optimisation

summarized in spectrometer-hours (“effort level” of an experiment)



Higher redshift dark energy model  $\rightarrow$  better constraints



## Alessandro Pannitti

CEO INCOACHING® e Coach Professionista

Nasco a Napoli nel 1967 e vivo a Senigallia. Ho maturato più di 20 anni di attività nel settore della moda, con esperienze come manager in ambito commerciale e poi come consulente. Per 6 anni ho vissuto in Danimarca ricoprendo il ruolo di manager presso la società Bestseller A/S, multinazionale dell'abbigliamento, contribuendo all'avvio del marchio internazionale O.N.L.Y...  
[...]

[LEGGI TUTTO](#)

[www.incoaching.it](http://www.incoaching.it)



## Definition

*Coaching* is a method of development of a person, which takes place within a **facilitating relationship**, based on the **identification and use of potential** for the achievement of **change/improvement objectives self-determined** and realized through an action plan.

# Coaching experience

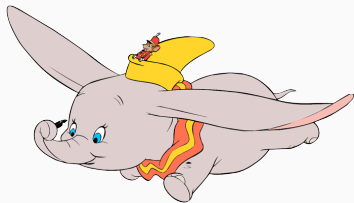
- you identify the problem
- you define long term goals (6-8 sessions)
- you define each session goals
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- and the coach???

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The coach **listen, ask questions**: and that is enough!

# Conclusions

## Ongoing projects:

- Cosmological tensions with Early Dark Energy
- N-body solvers for Modified Gravity models
- Gravitational Waves decay into Dark Energy
- Reconstructing gravity
- Speed up for weak lensing constraints

## Training:

- Coaching. I recommend it!
- Planned technical courses on data analysis/science

## Secondment:

- I will let you know how it goes...

**Thank you!**