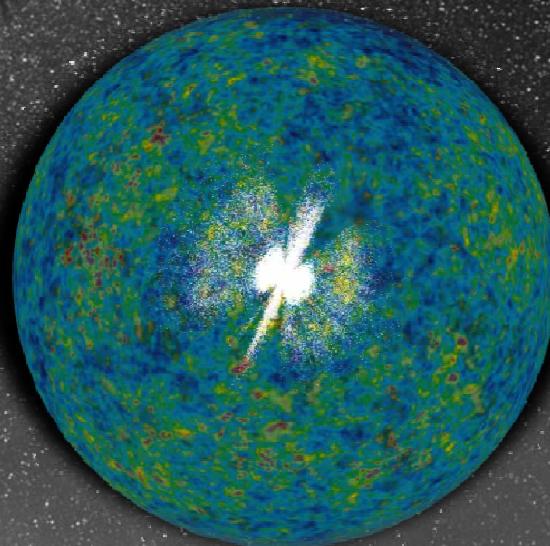
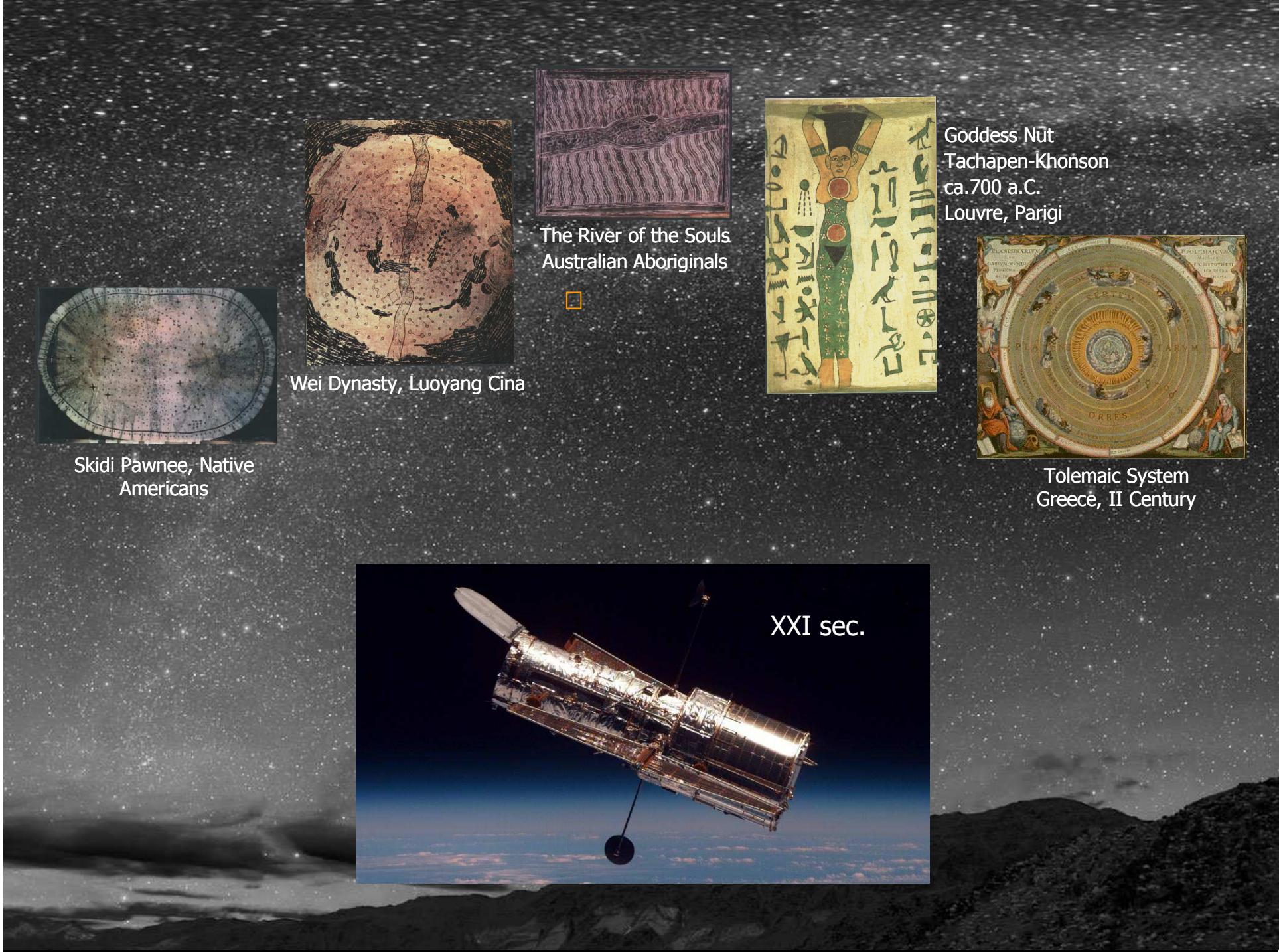


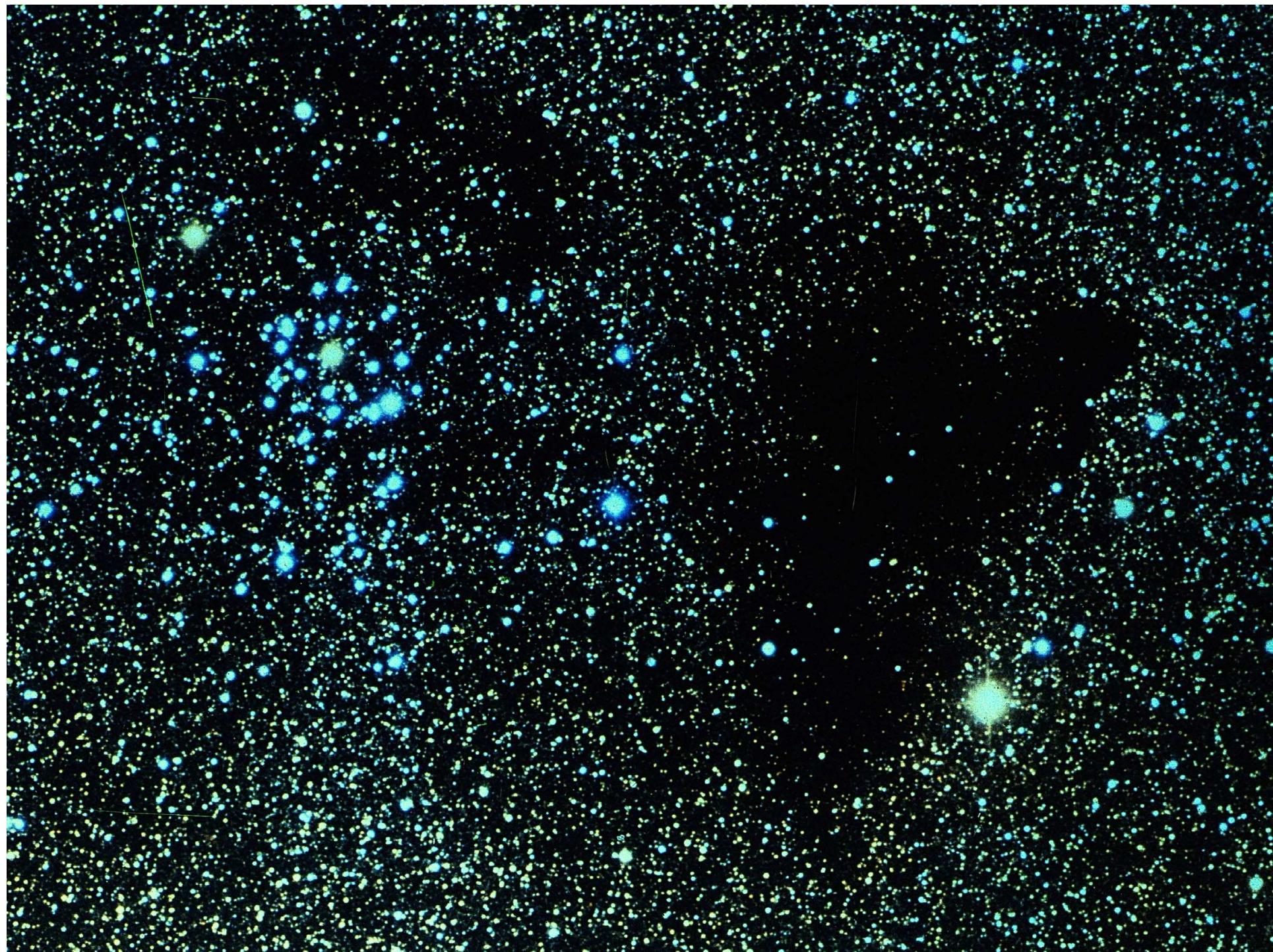
# *The Planck mission Looking back to the dawn of time*

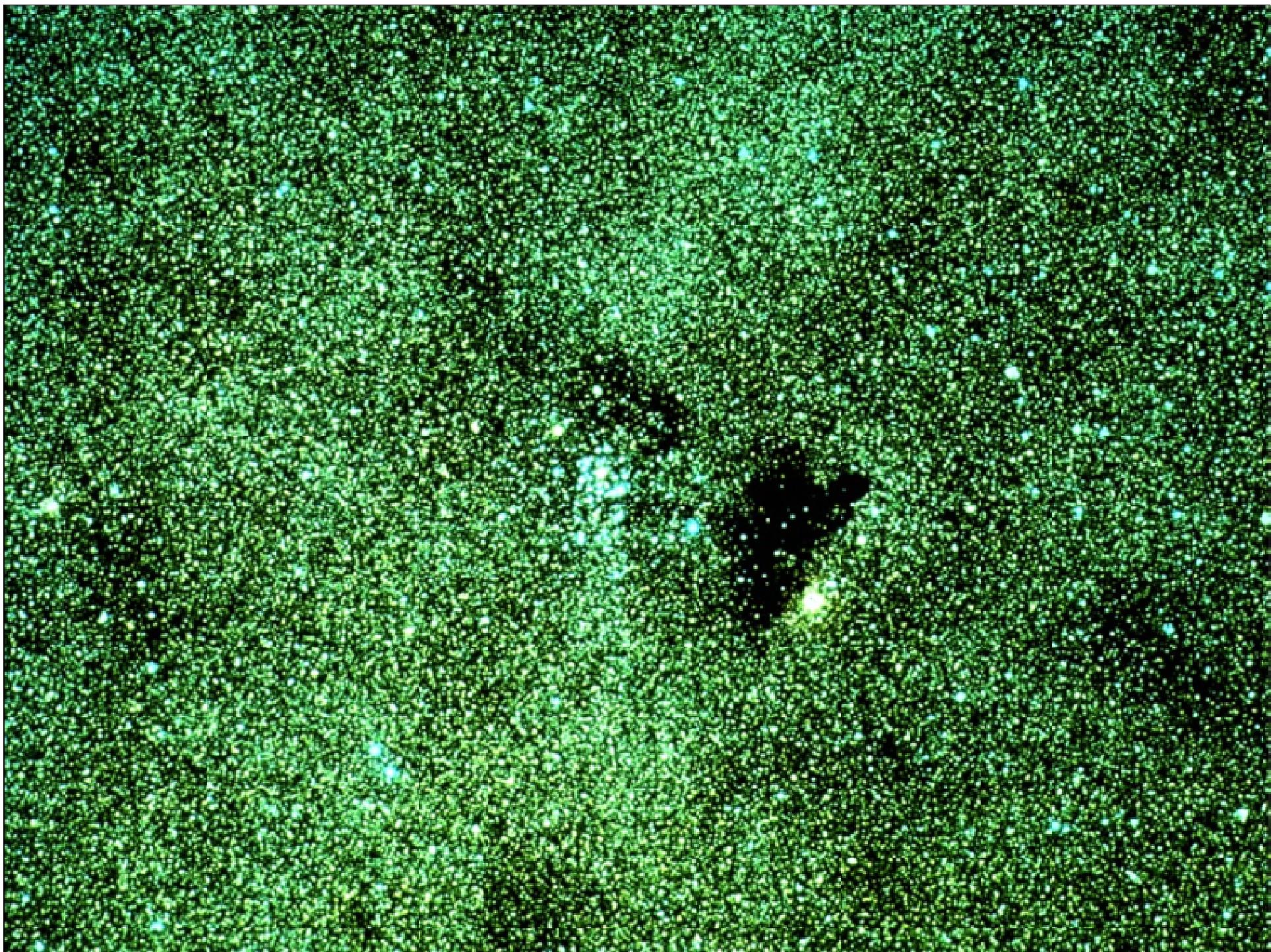


Marco Bersanelli

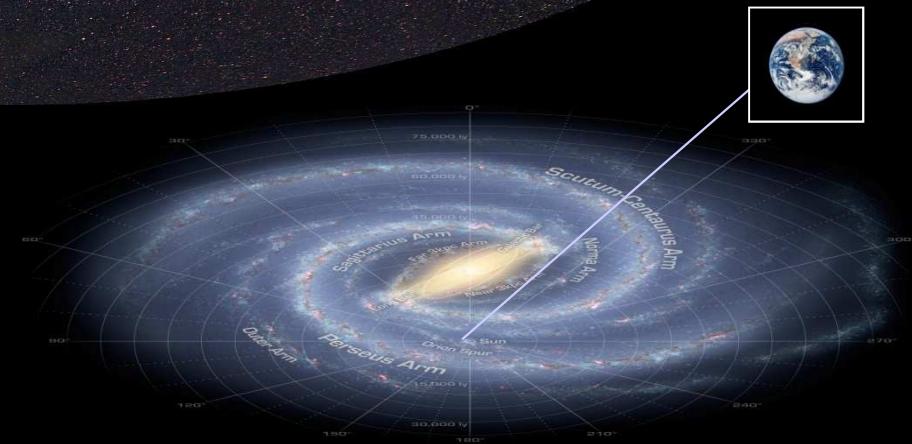
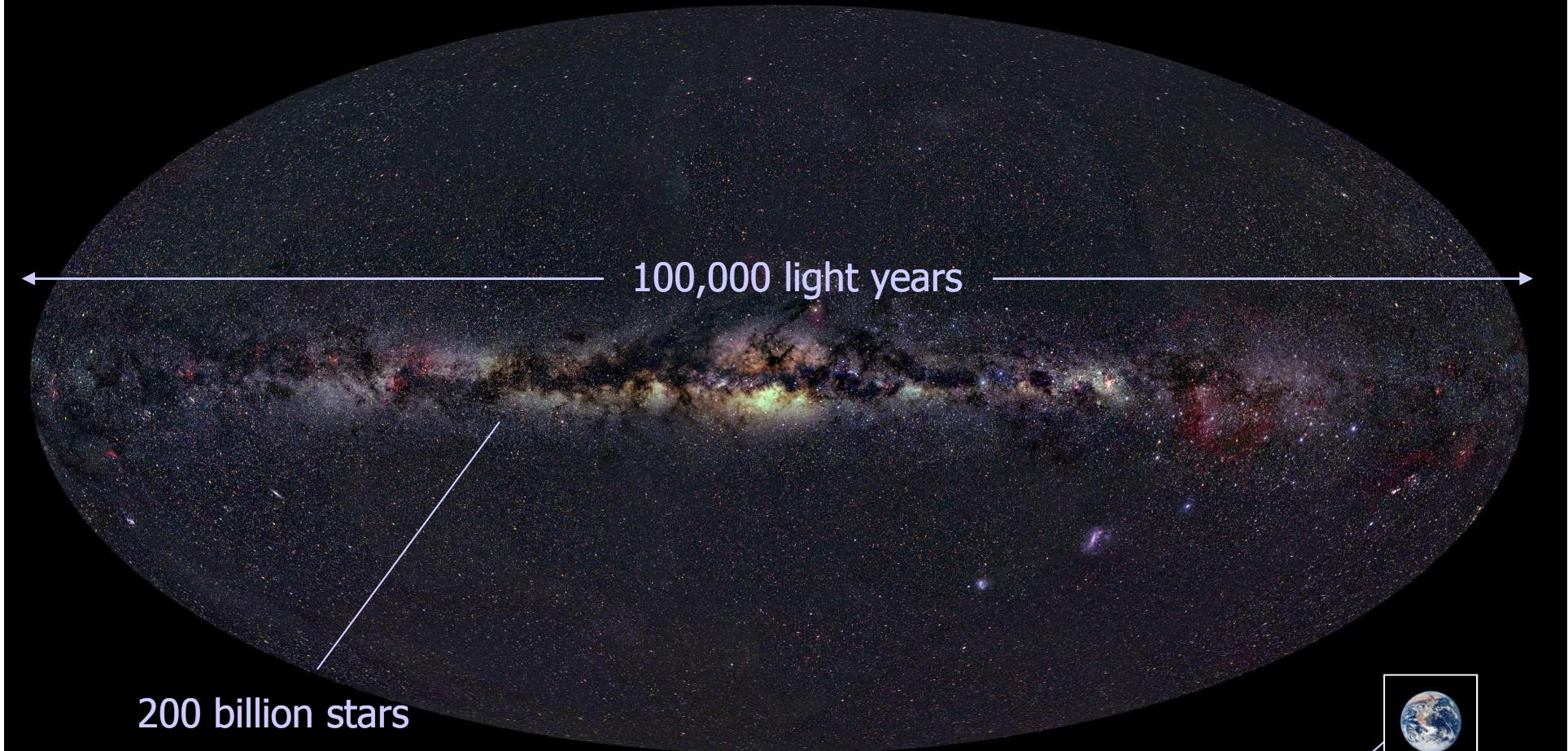
*Dipartimento di Fisica, Università degli Studi di Milano  
Planck-LFI Instrument Scientist*

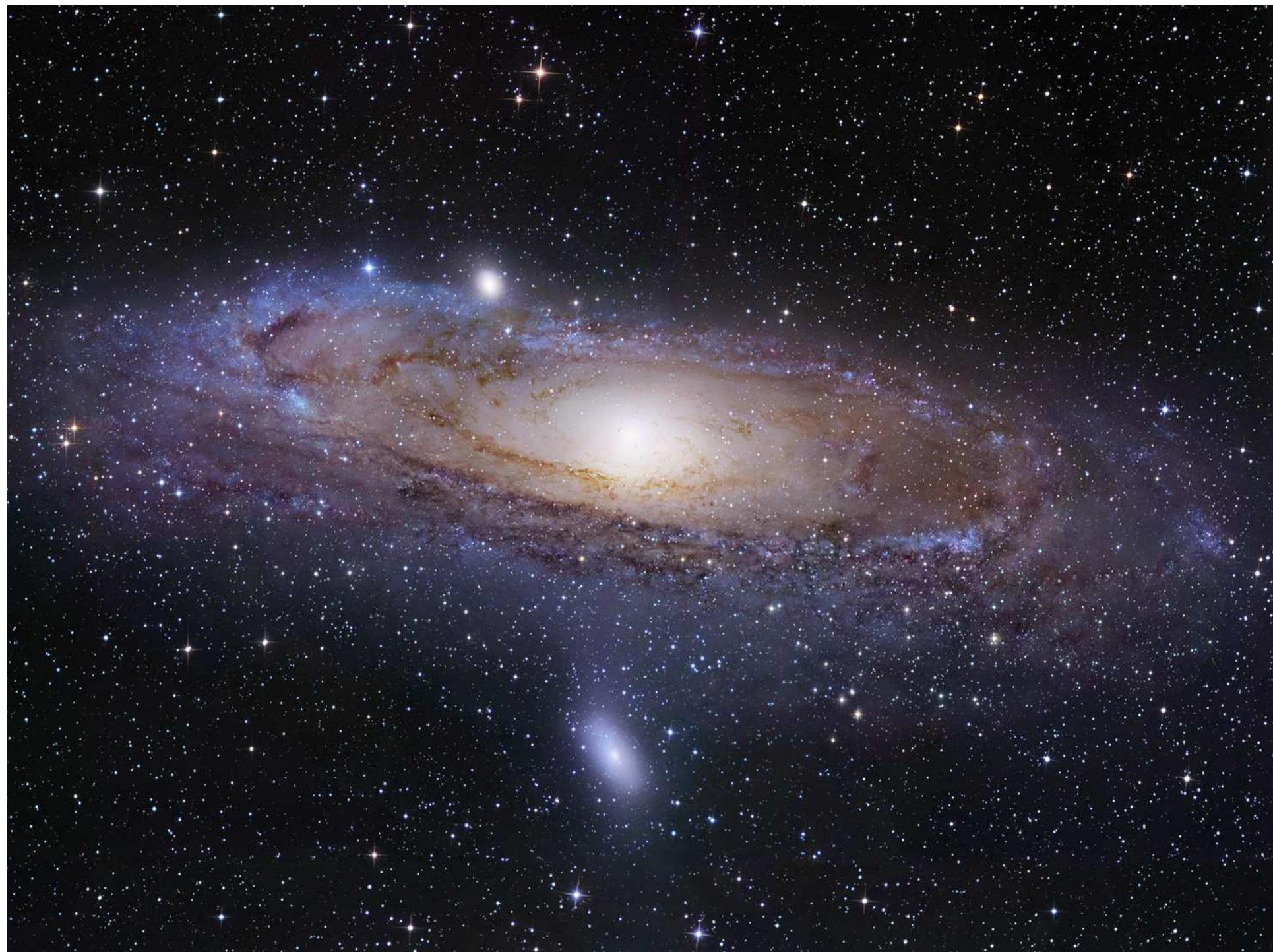






# The Milky Way





# 3D Map of the Universe

2dF Galaxy Redshift Survey  
Goal: 250,000 galaxies mapped

Sloan Digital Sky Survey  
Goal: 1 million galaxies  
100,000 QSO



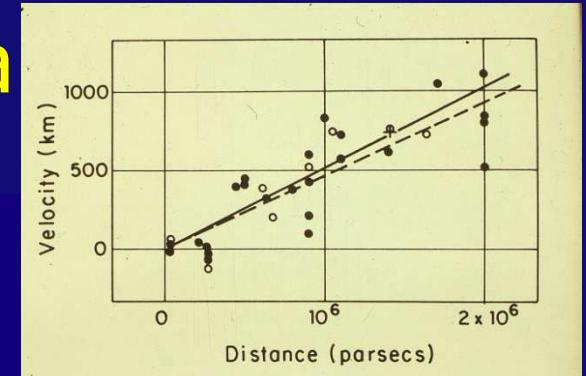




# Espansione cosmica

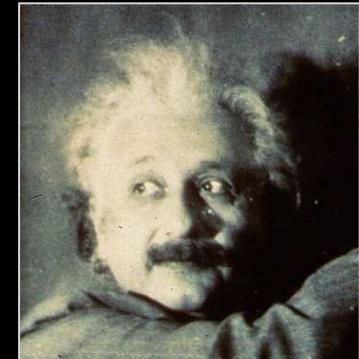
Edwin Hubble - 1929

$$v_r = H_0 \cdot d$$

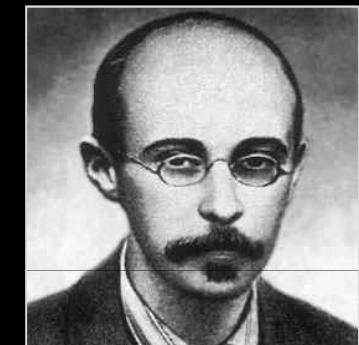


Nel lontano passato l'universo doveva essere molto più piccolo, più denso e più caldo di oggi...

# *Evoluzione e Geometria*



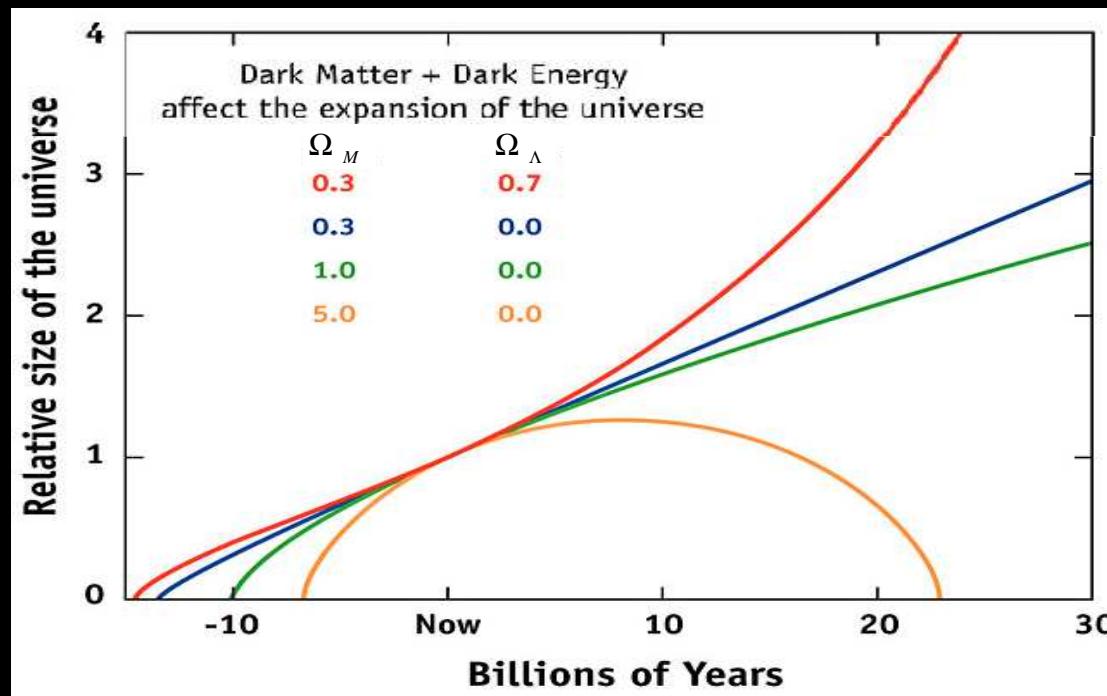
*Albert Einstein*

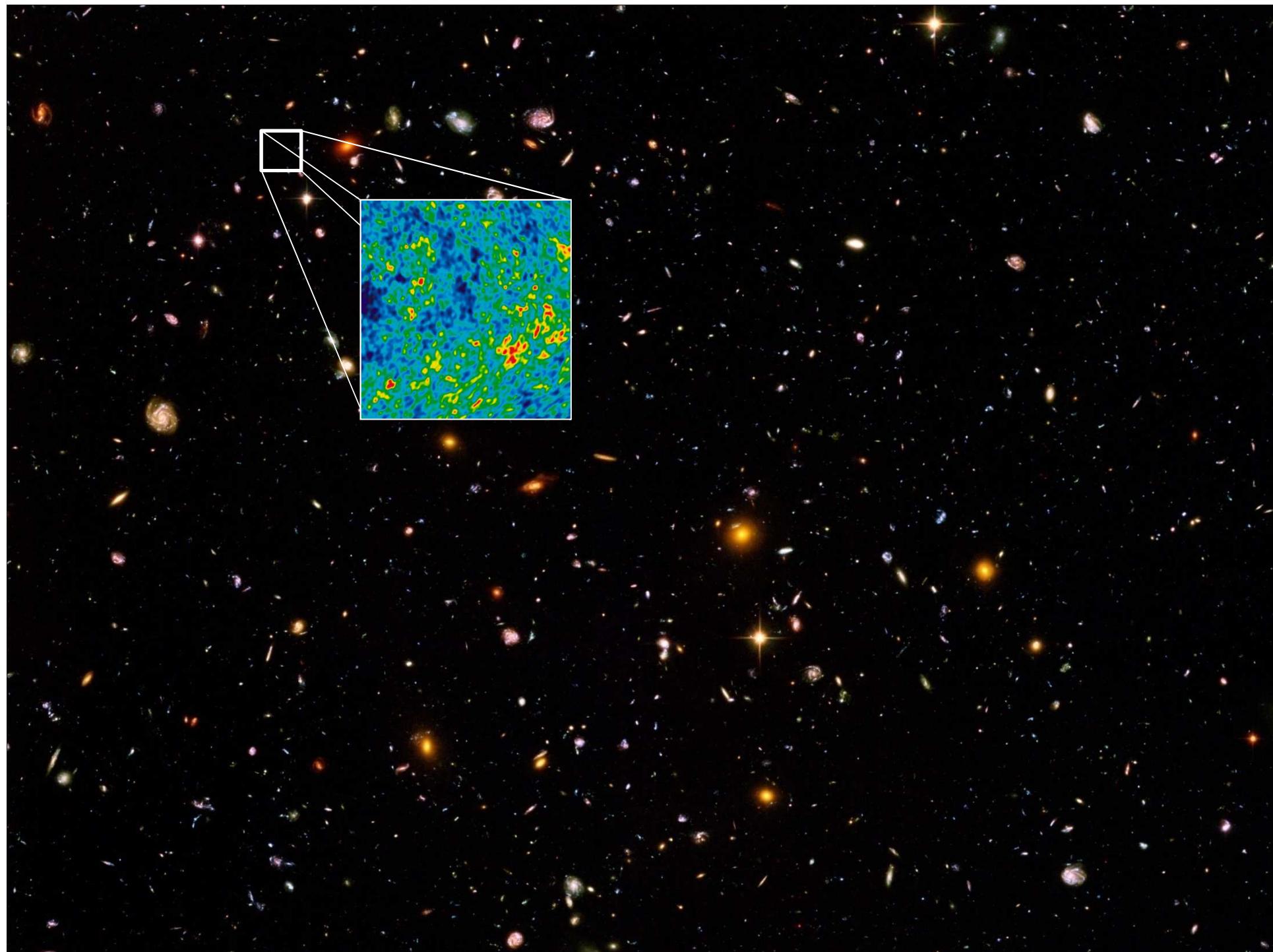


*Alexander Friedmann*

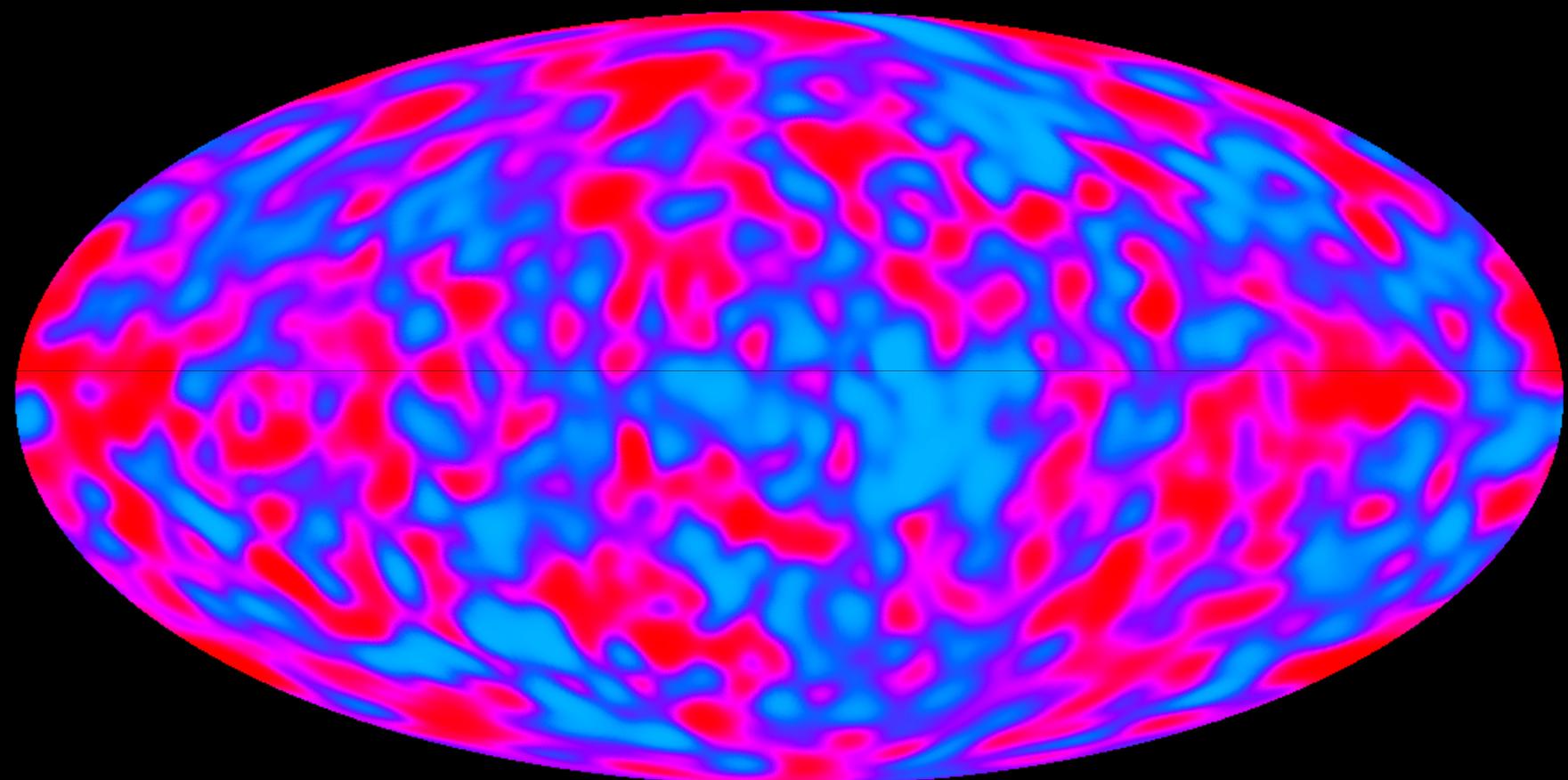


*Georges Lemaître*



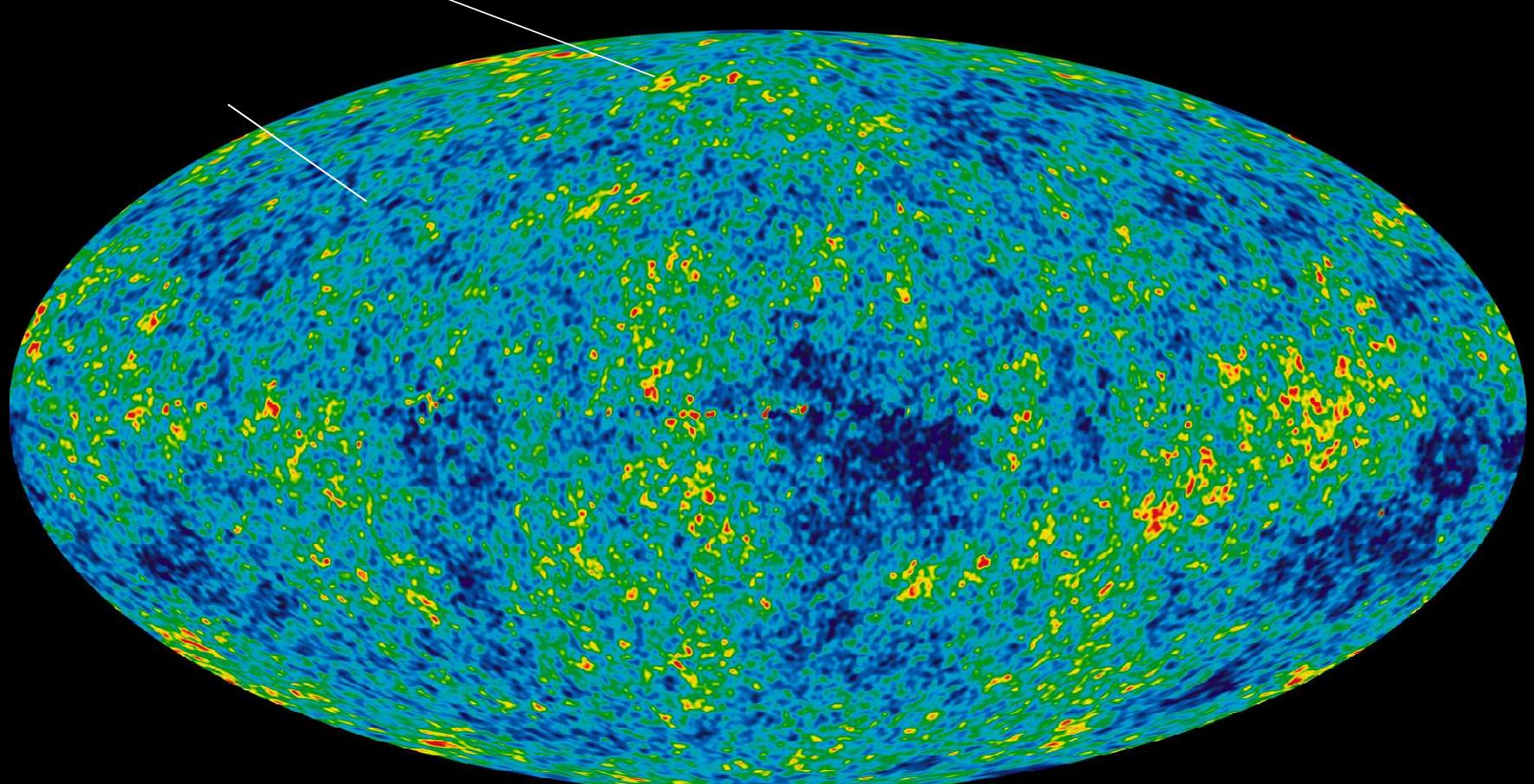


The universe 13.7 billion years ago



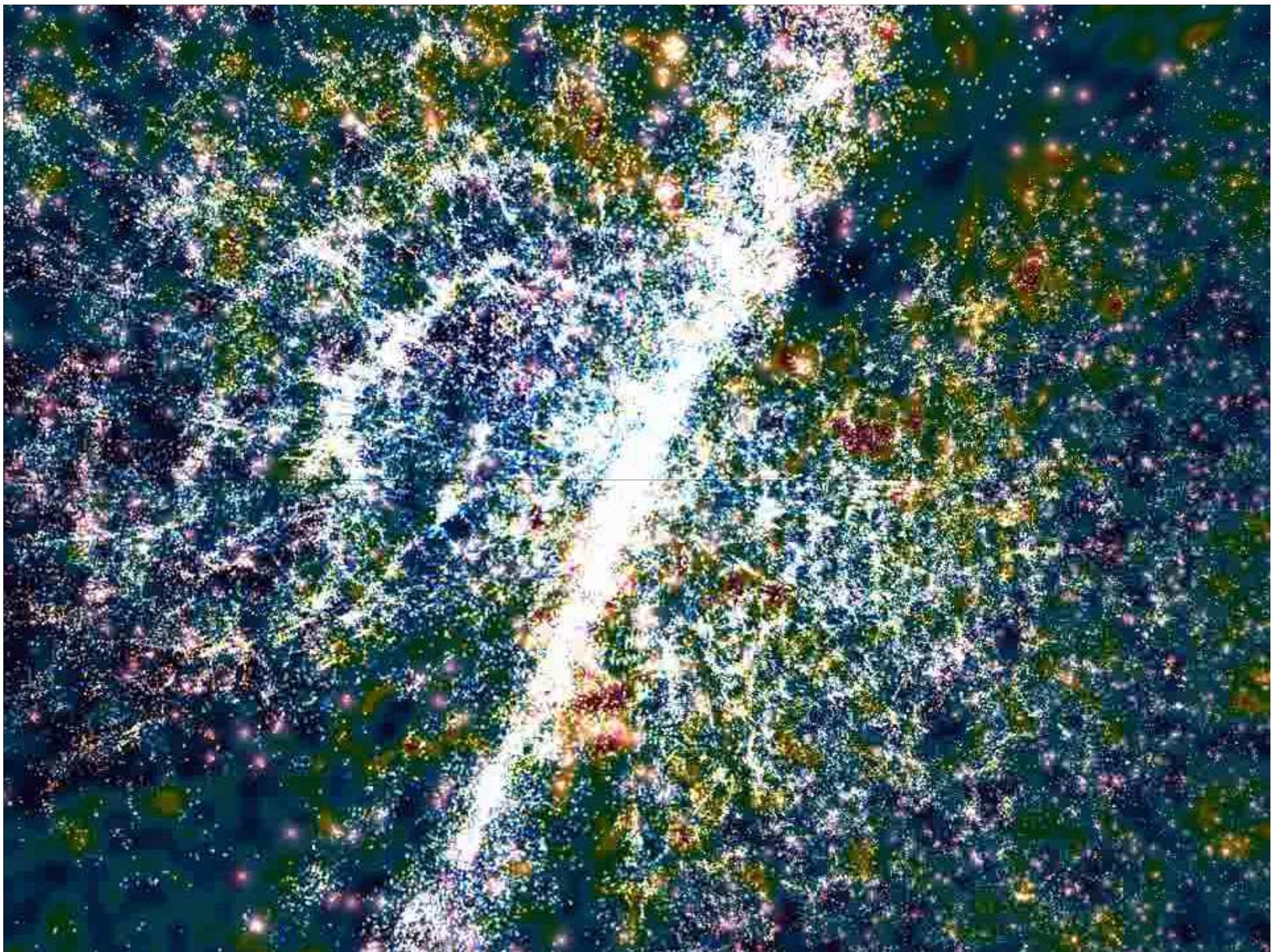
**COBE, 1989**

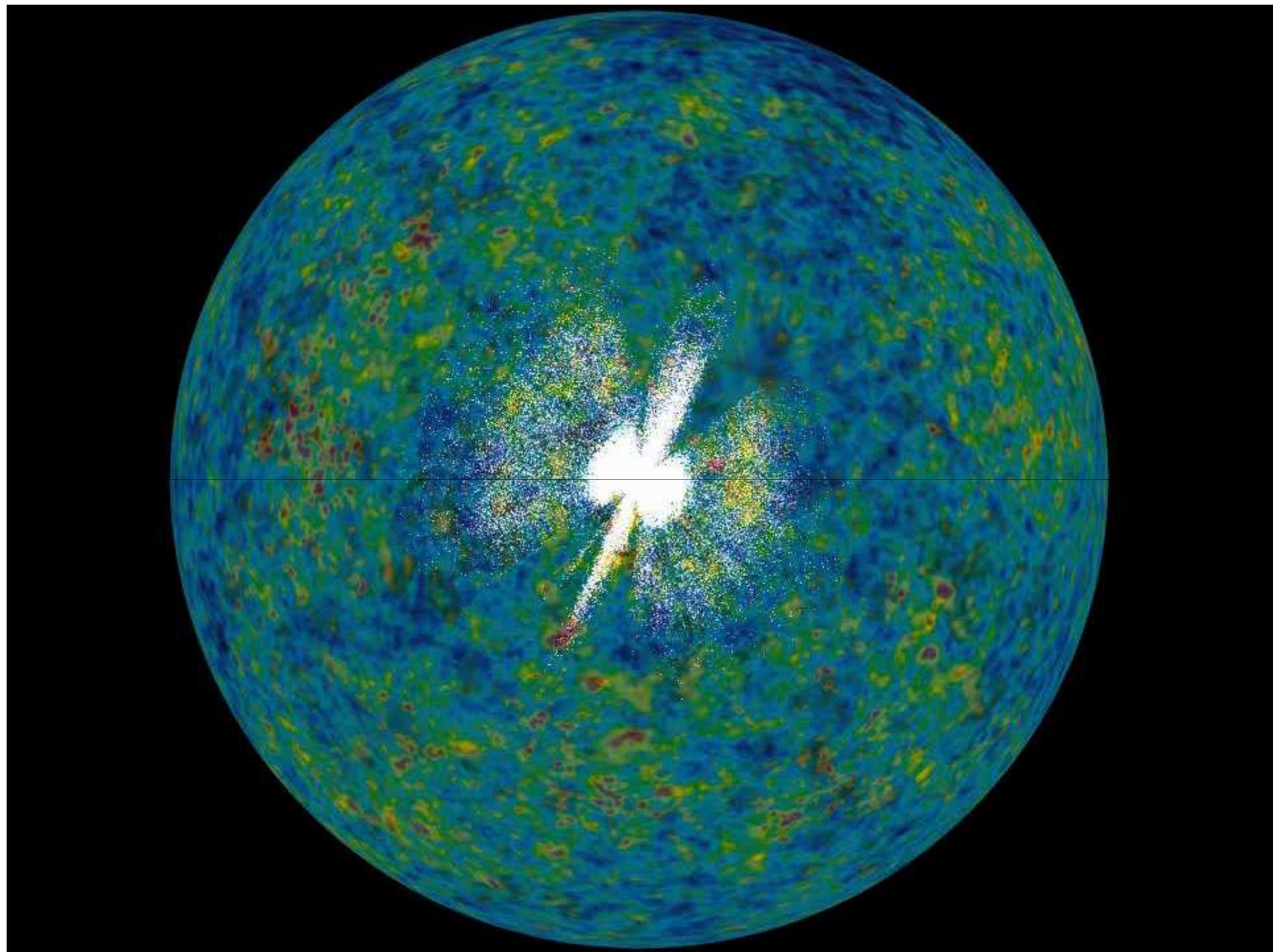
The universe 13.7 billion years ago



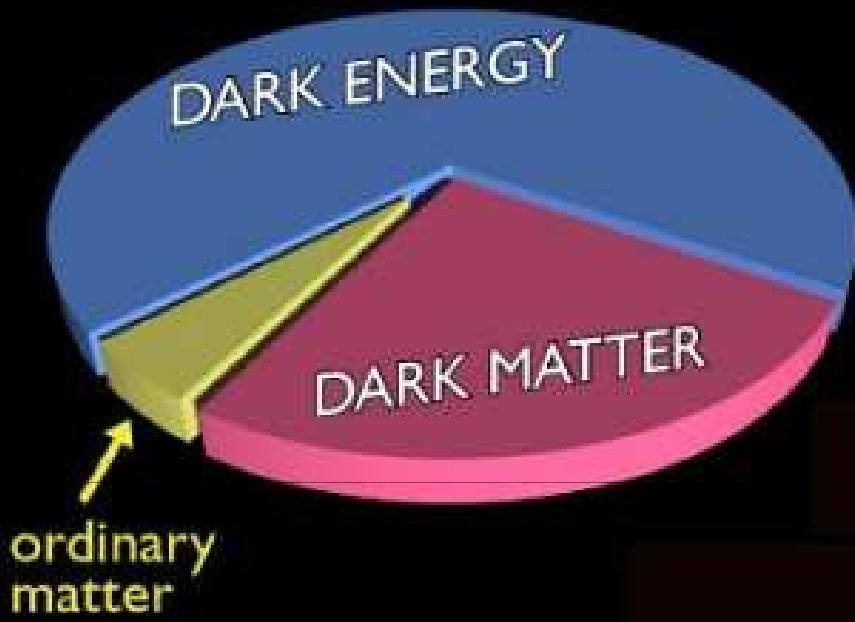
WMAP, 2000







# Unknown universe



- What are the “ingredients” of the universe?
- What happened in the very first instants?
- What is the future of cosmic expansion?

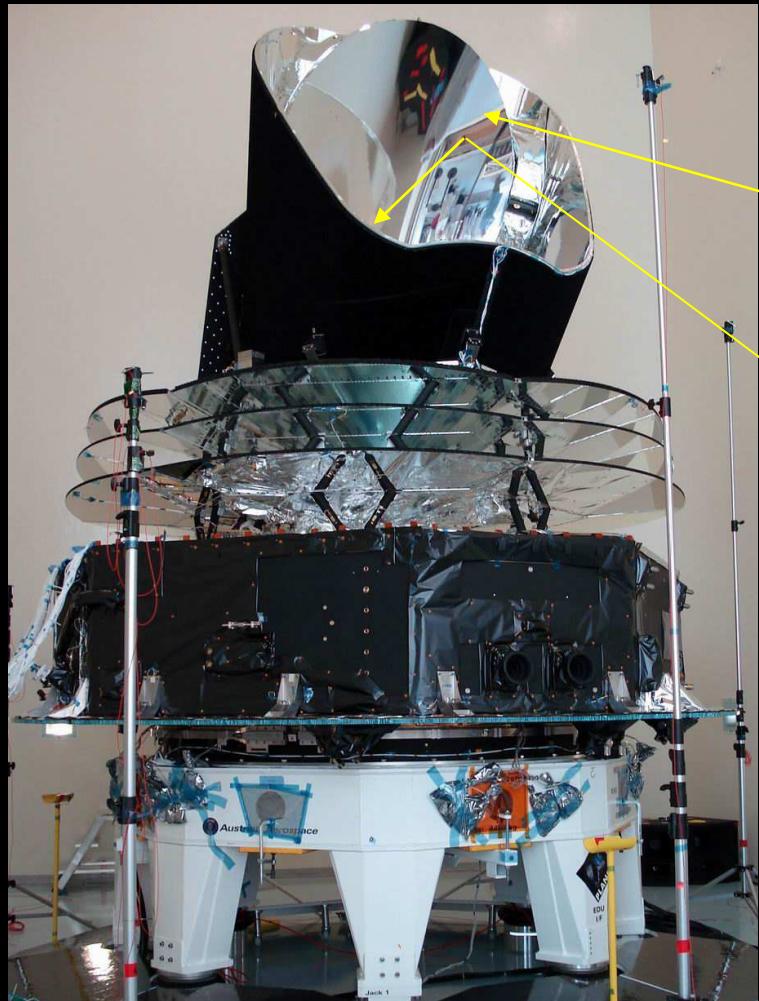


# PLANCK

*Looking back to the dawn of time*



Planck Telescope  
1.5x1.9m off-axis  
Gregorian  
 $T = 50\text{ K}$



LFI Radiometers  
27-77 GHz,  $T = 20\text{ K}$

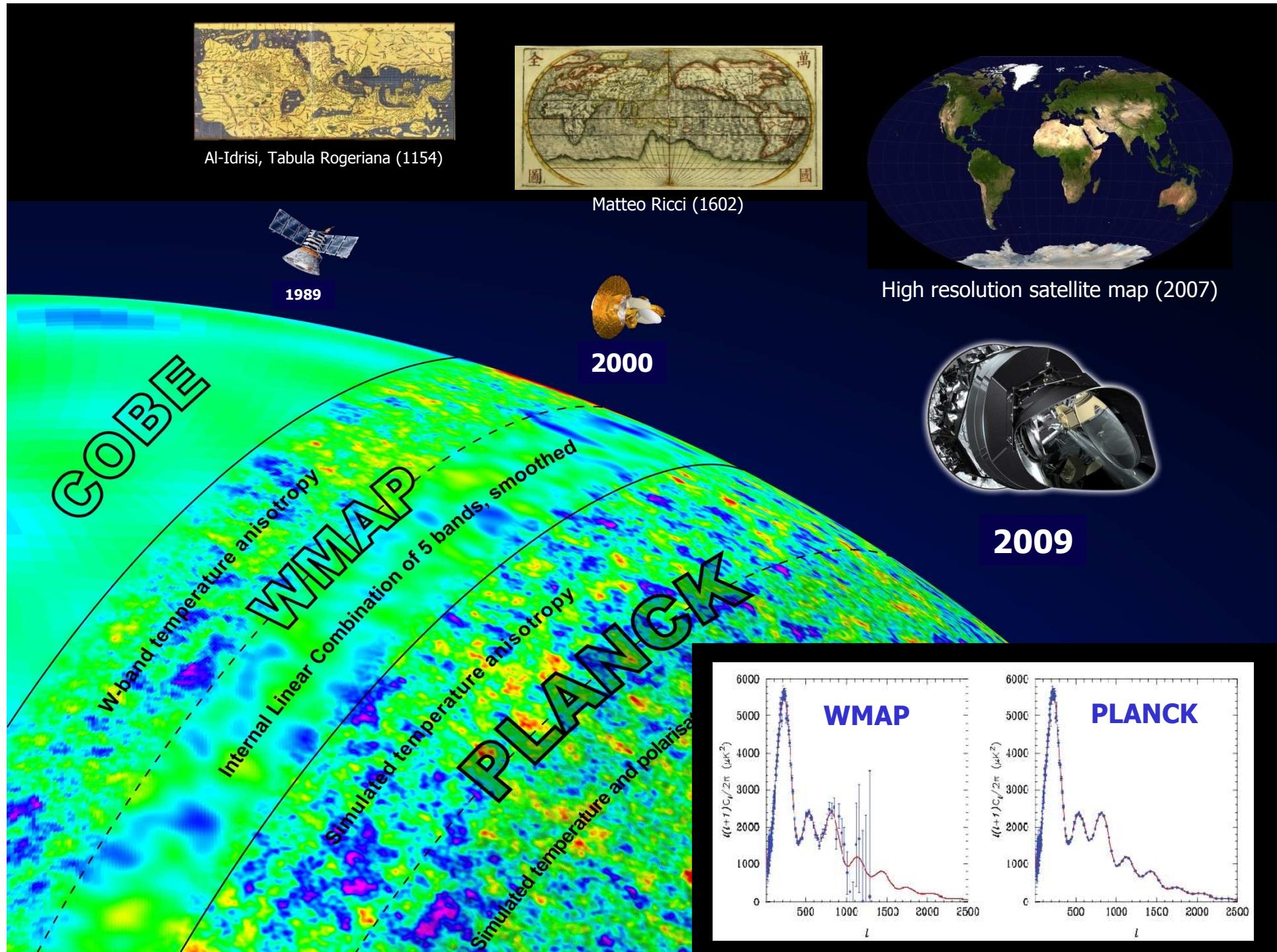


HFI Bolometers  
100-850 GHz,  $T = 0.1\text{ K}$



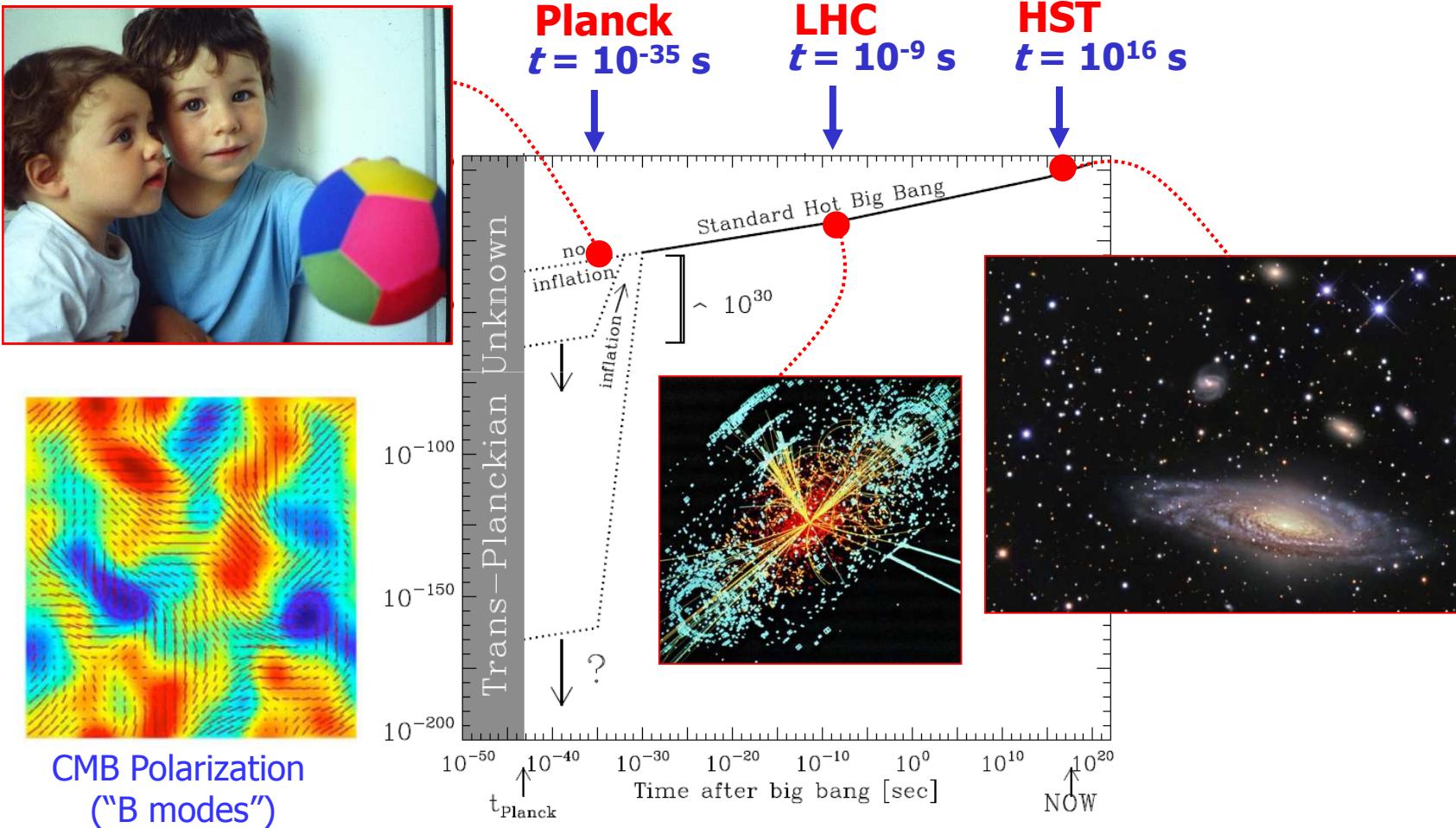
**PLANCK**





# **At the edge of space and time**

# The very first moments: Inflation?

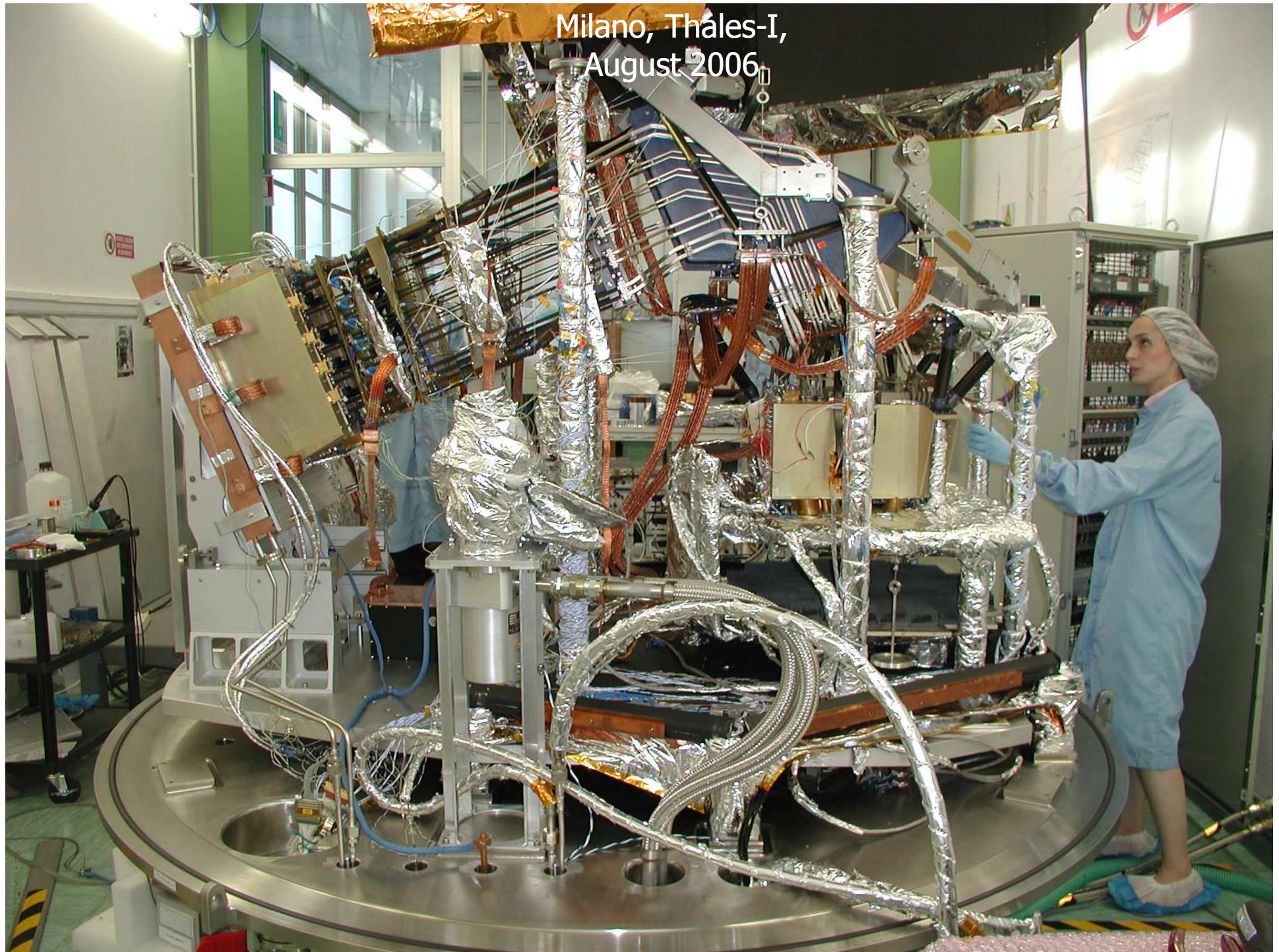


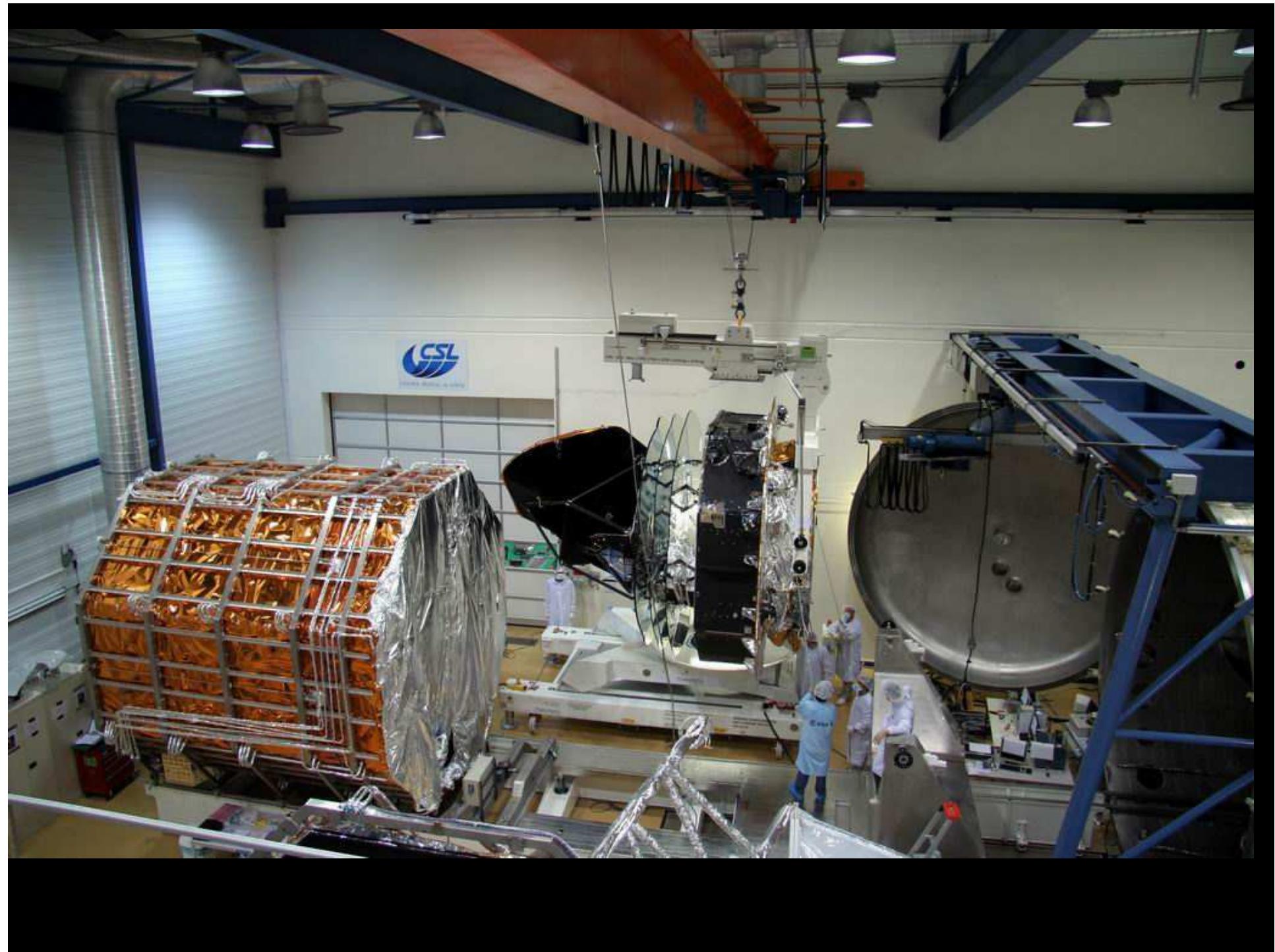
Science can only describe the evolution of *something* that is already there





Milano, Thales-I,  
August 2006







Kourou, March 2009

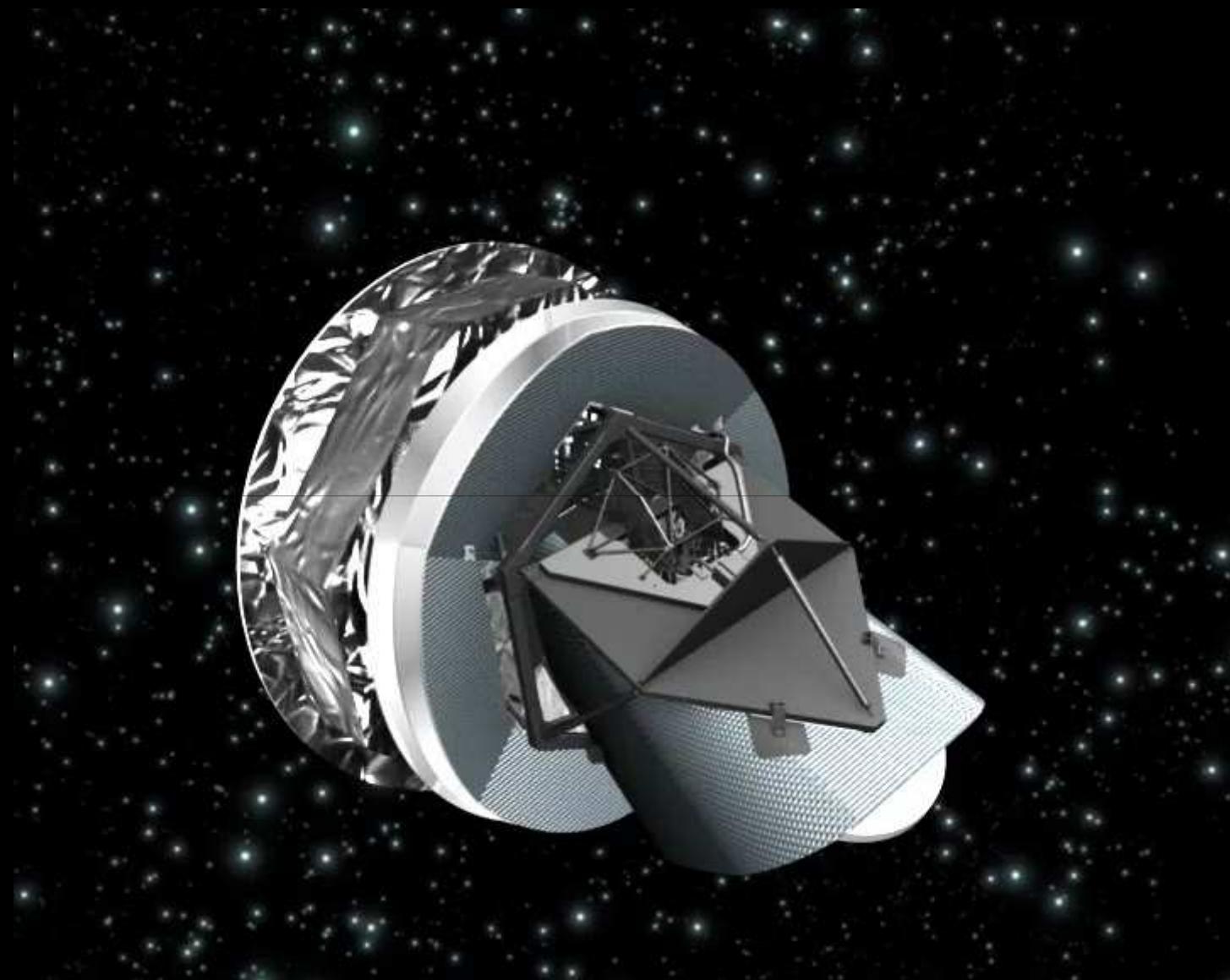
Kourou (French Guyana), February 2009





Kourou, French Guyana, 14 May 2009, h 10:12

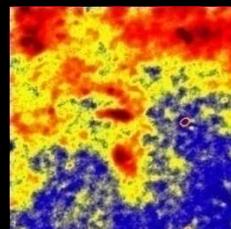




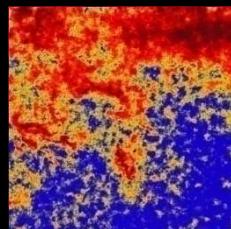


**PLANCK**

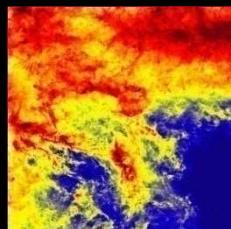
17 March 2010



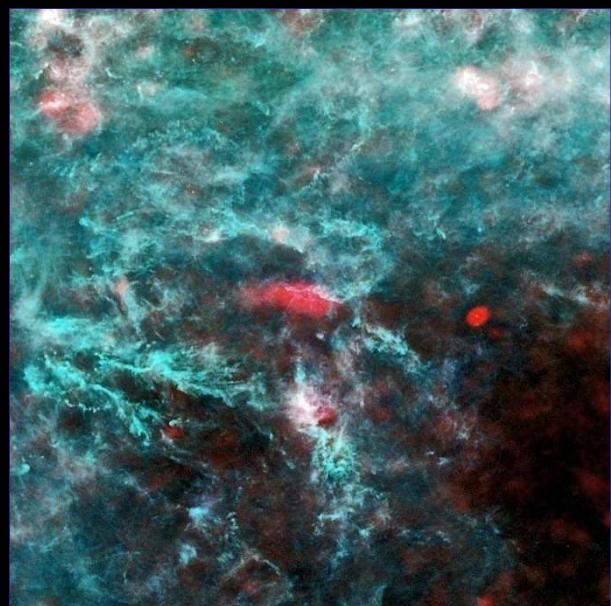
30GHz



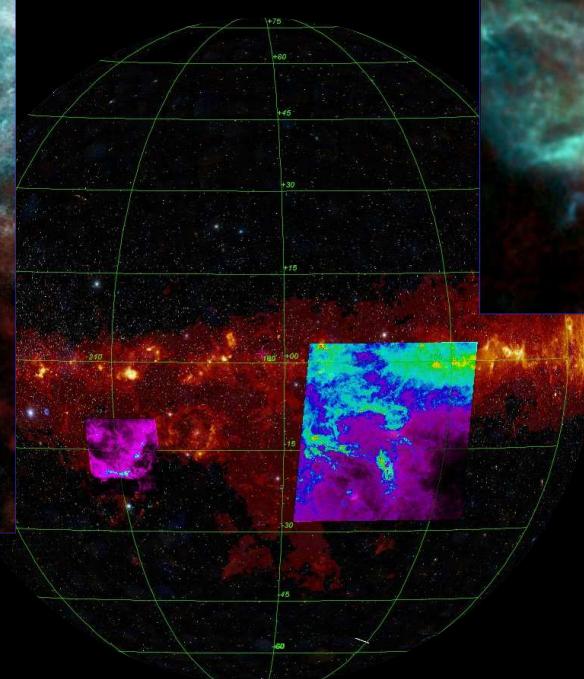
353GHz



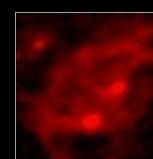
857GHz



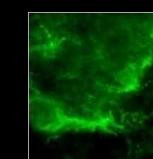
Perseus  
30+353+857GHz



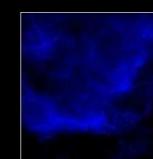
Orion Nebula  
30+353+857GHz



30GHz



353GHz



857GHz



**PLANCK**

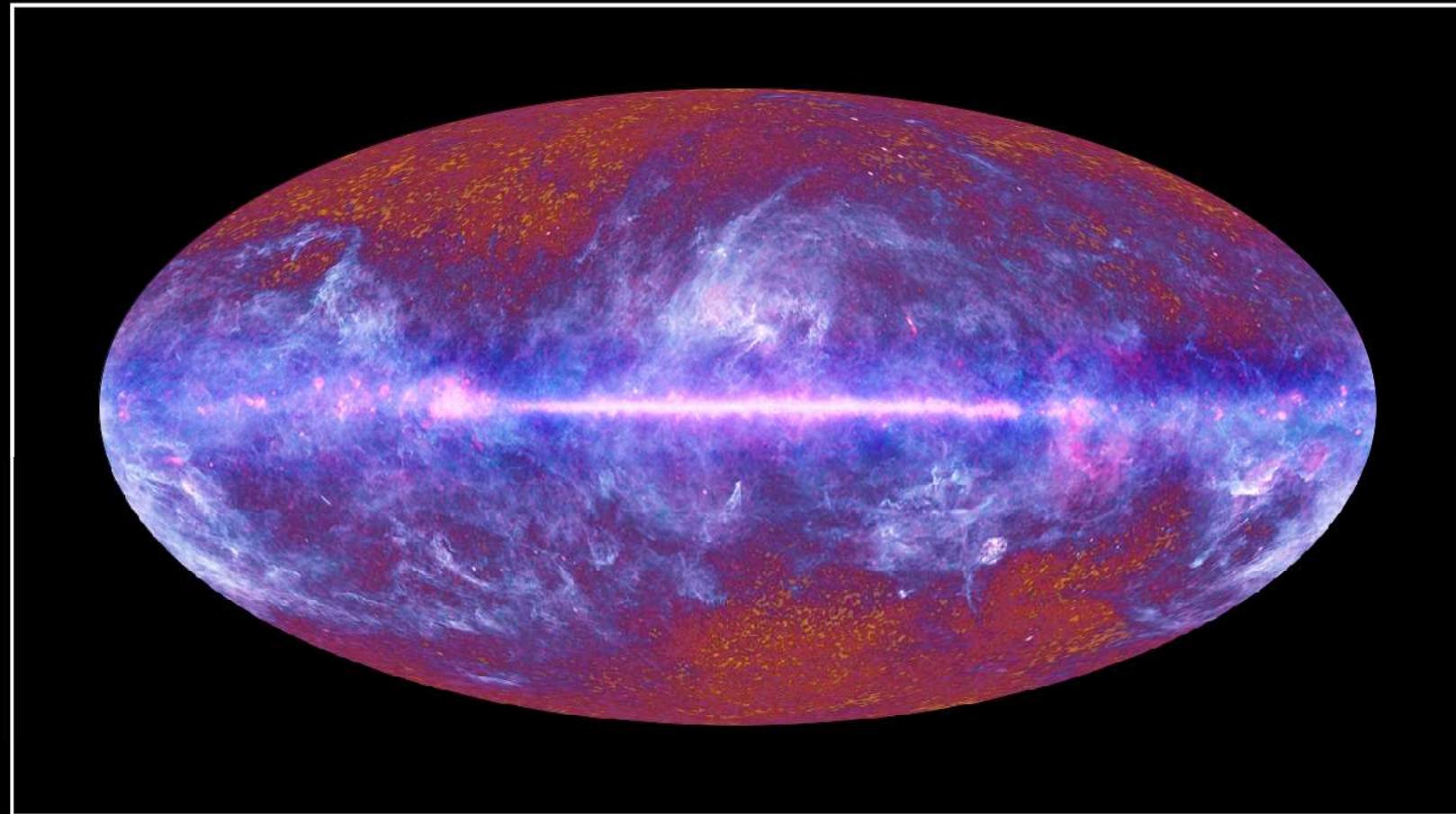




**PLANCK**



1 July 2010



The Planck one-year all-sky survey

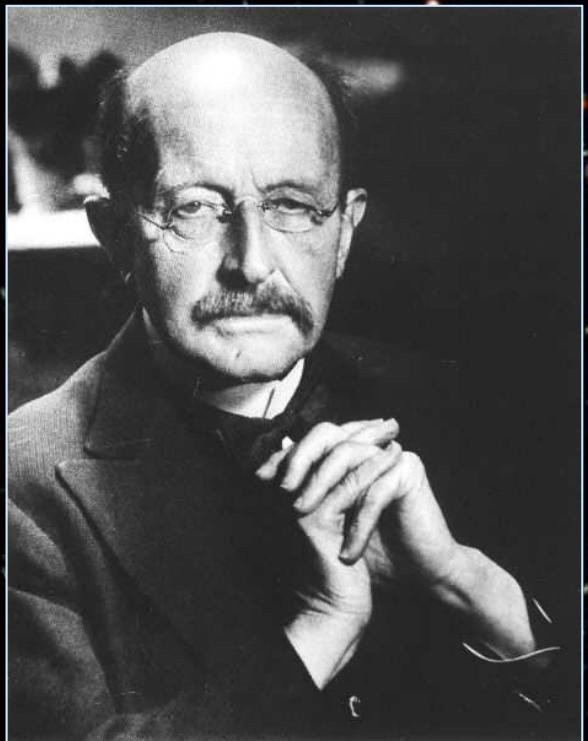


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**PLANCK**





Max Planck (1858 – 1947)

“The greatest joy of a thinking man  
is to have explored the explorable  
and just to admire the unexplorable.”

J. W. von Goethe, quoted by  
Max Planck

Harnack Building of the Max Planck Society, Berlin.