Introduction to Cosmology

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CERN, July 2019

14 billion years of the Universe history in 3 hours

- Expansion of the Universe
- Hot Big Bang
- Inflation

Recap from lecture 1

$$ds^2 = dt^2 - a^2(t)dr^2$$

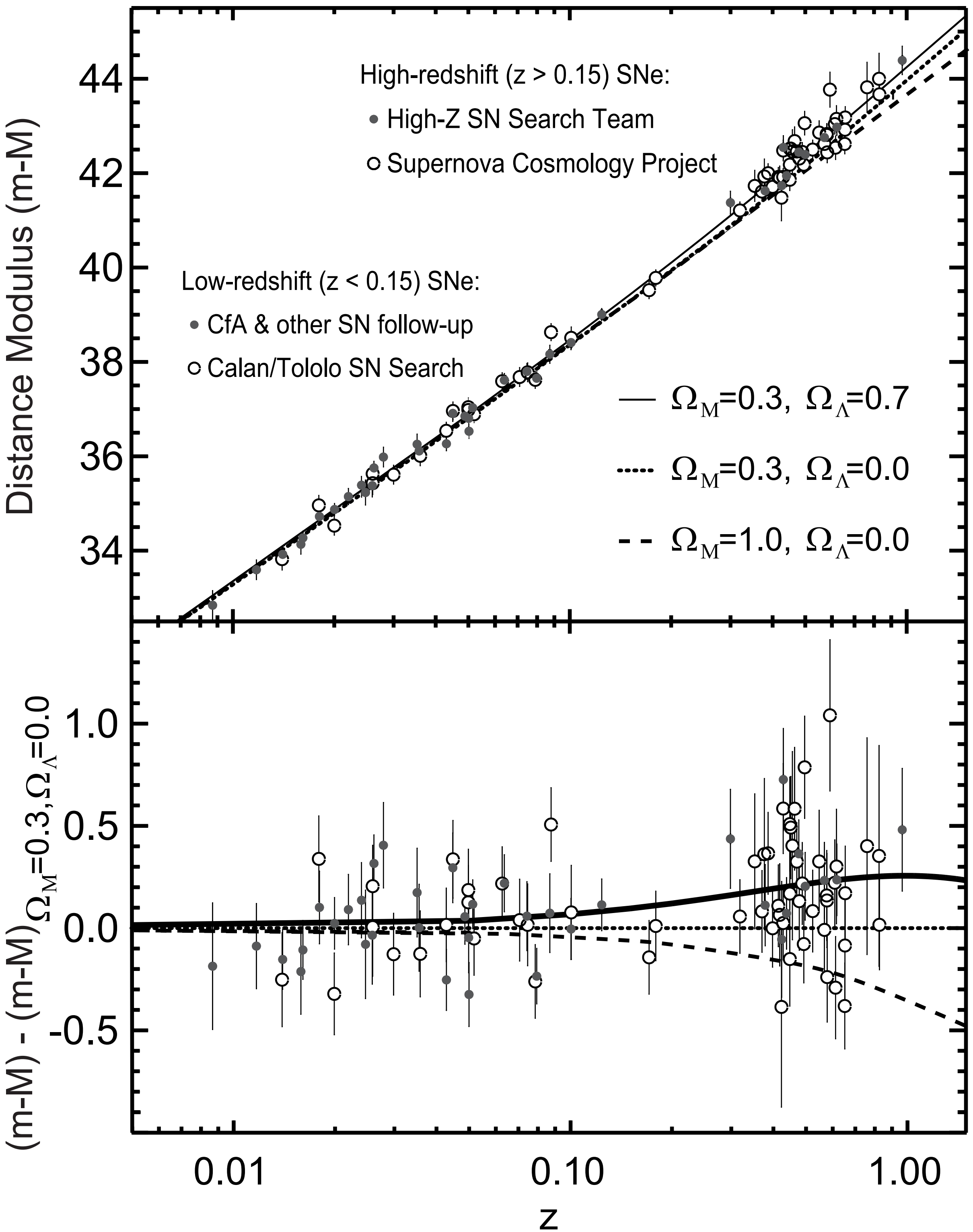
$$H = \frac{\dot{a}}{a}$$

$$H^2 = \frac{8\pi G}{3}\rho$$

Energy density

For non-relativistic matter: $\rho_m \propto \frac{1}{a^3}$

Perlmutter & Schmidt,
Lect.Notes Phys. 598, 195 (2003)



Discovery of accelerated expansion:

S. Perlmutter,
B. Schmidt,
A. Riess

2011

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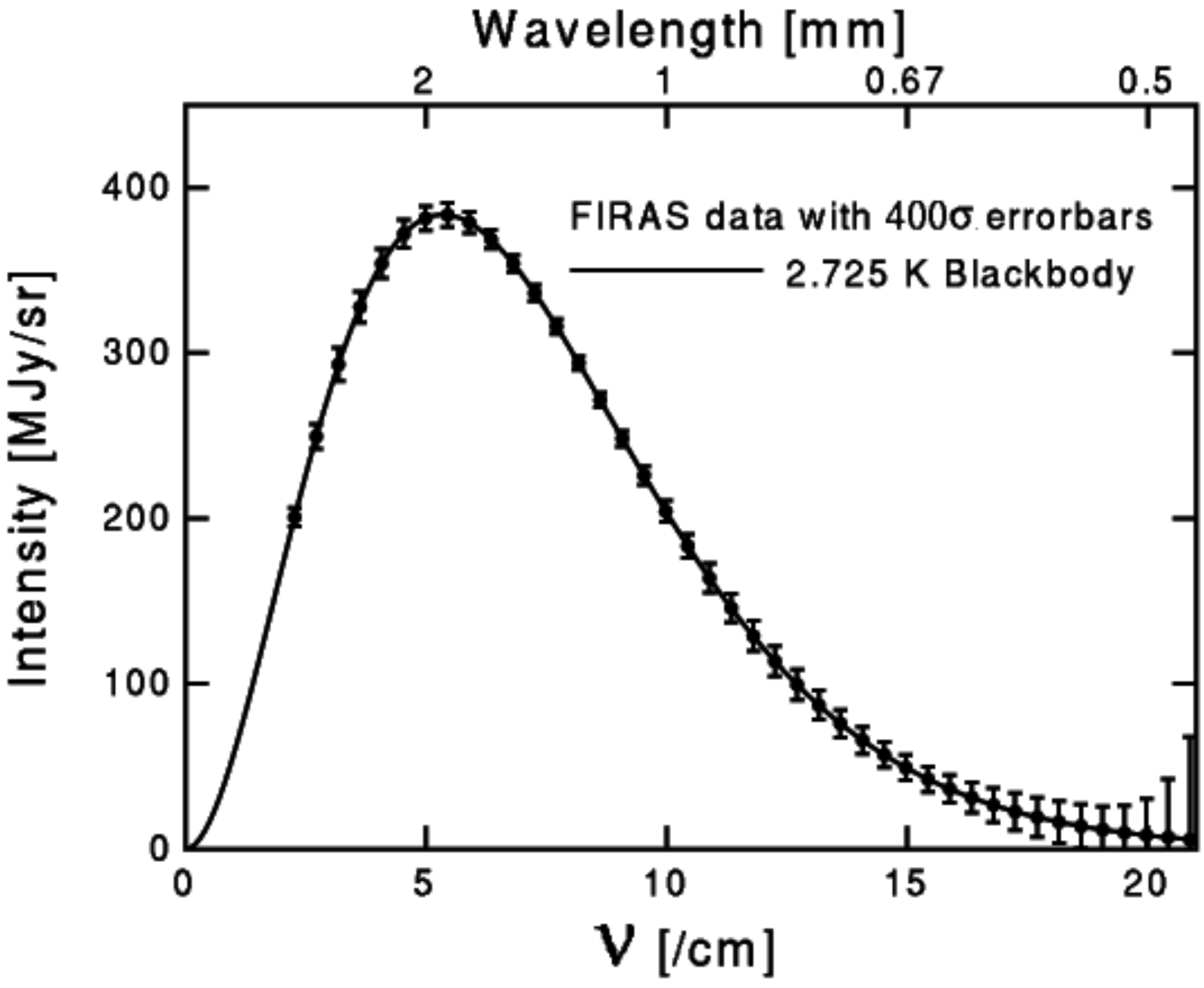
CMB: perfect blackbody

A. Penzias,
R. Wilson

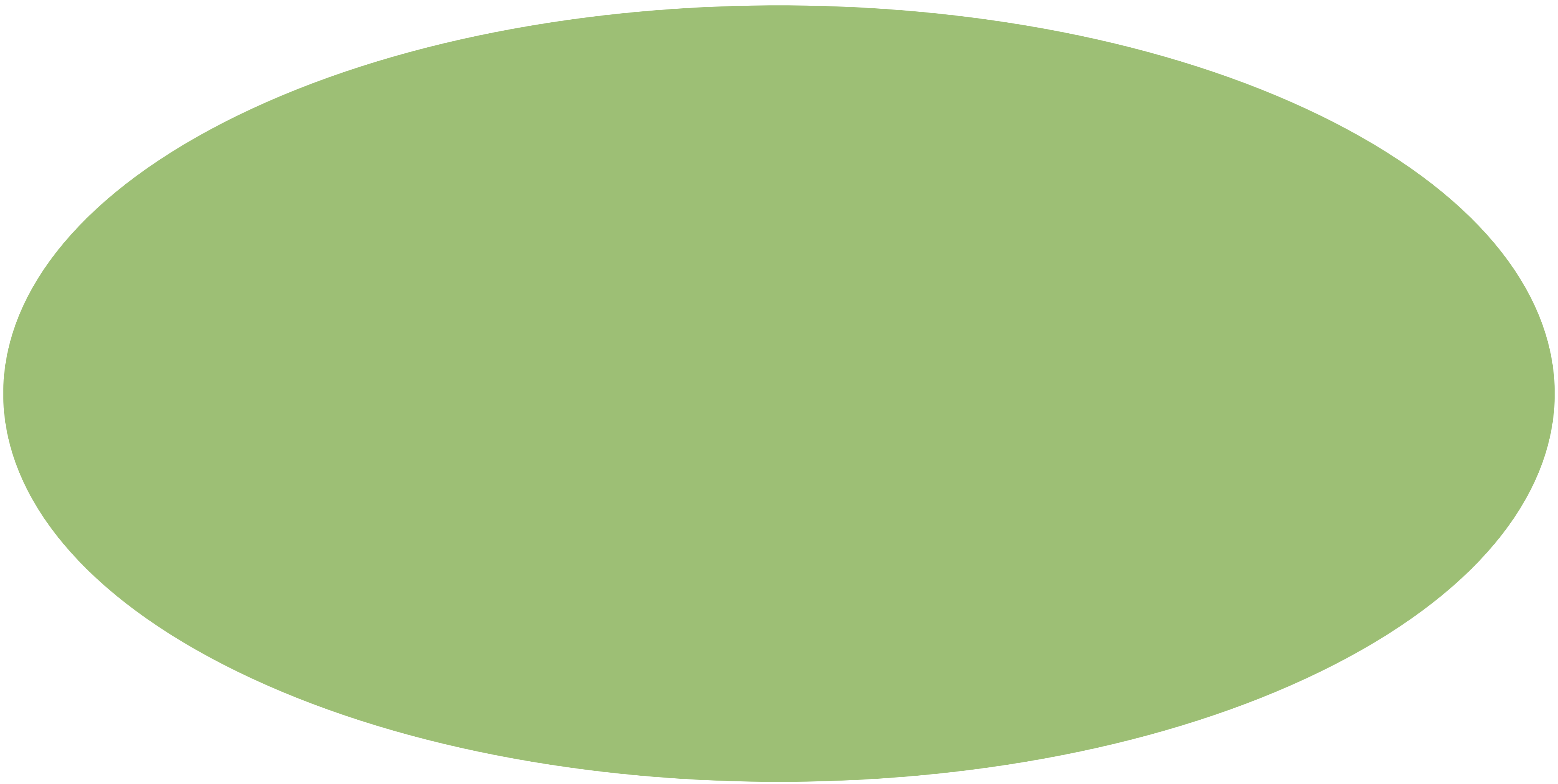
1978

J. Mather,
G. Smooth

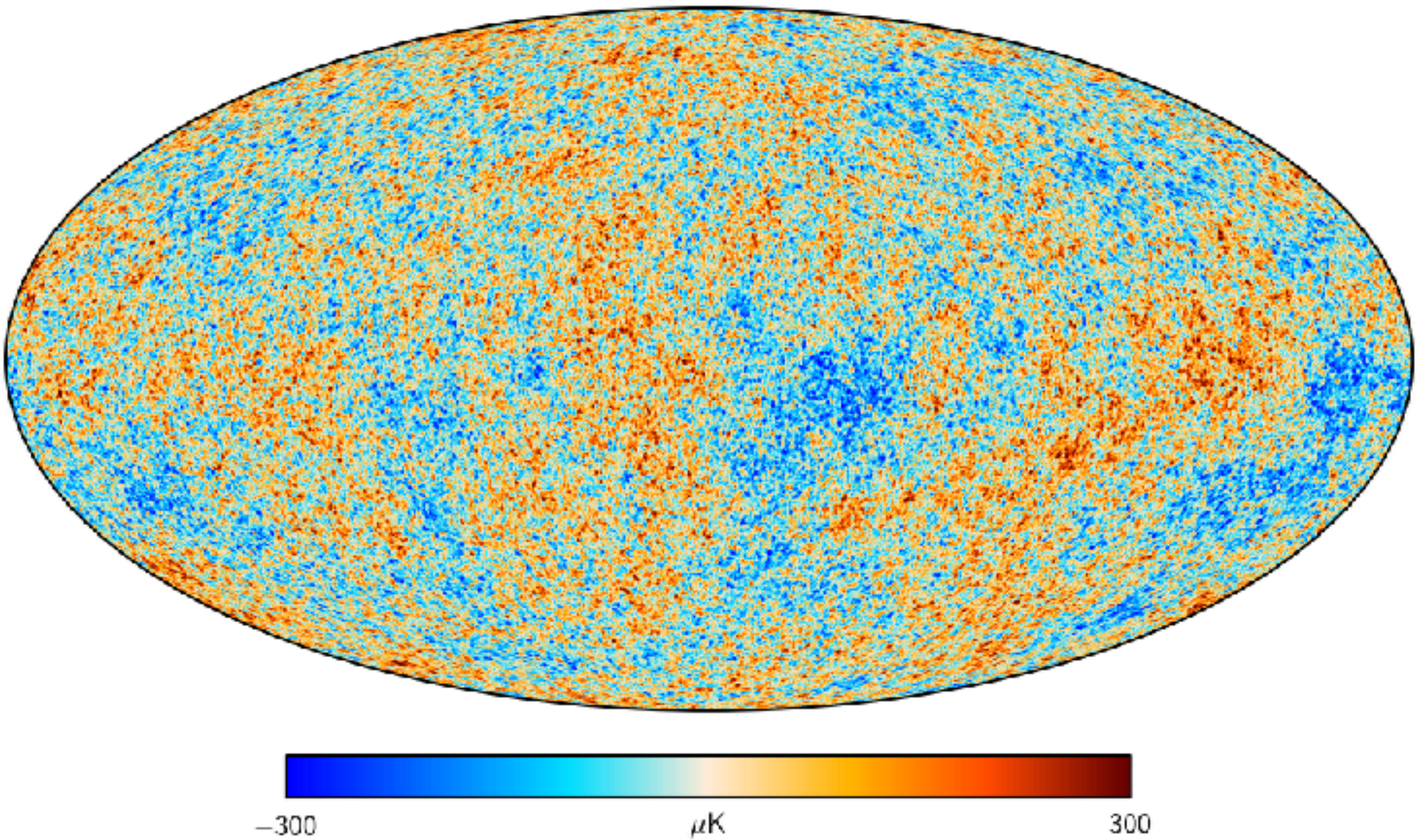
2006



Portrait of the Universe in youth



Portrait of the Universe in youth: finer details



Planck coll. (2015)