

An introduction to the physics of the Cosmic Microwave Background

Jan Hamann



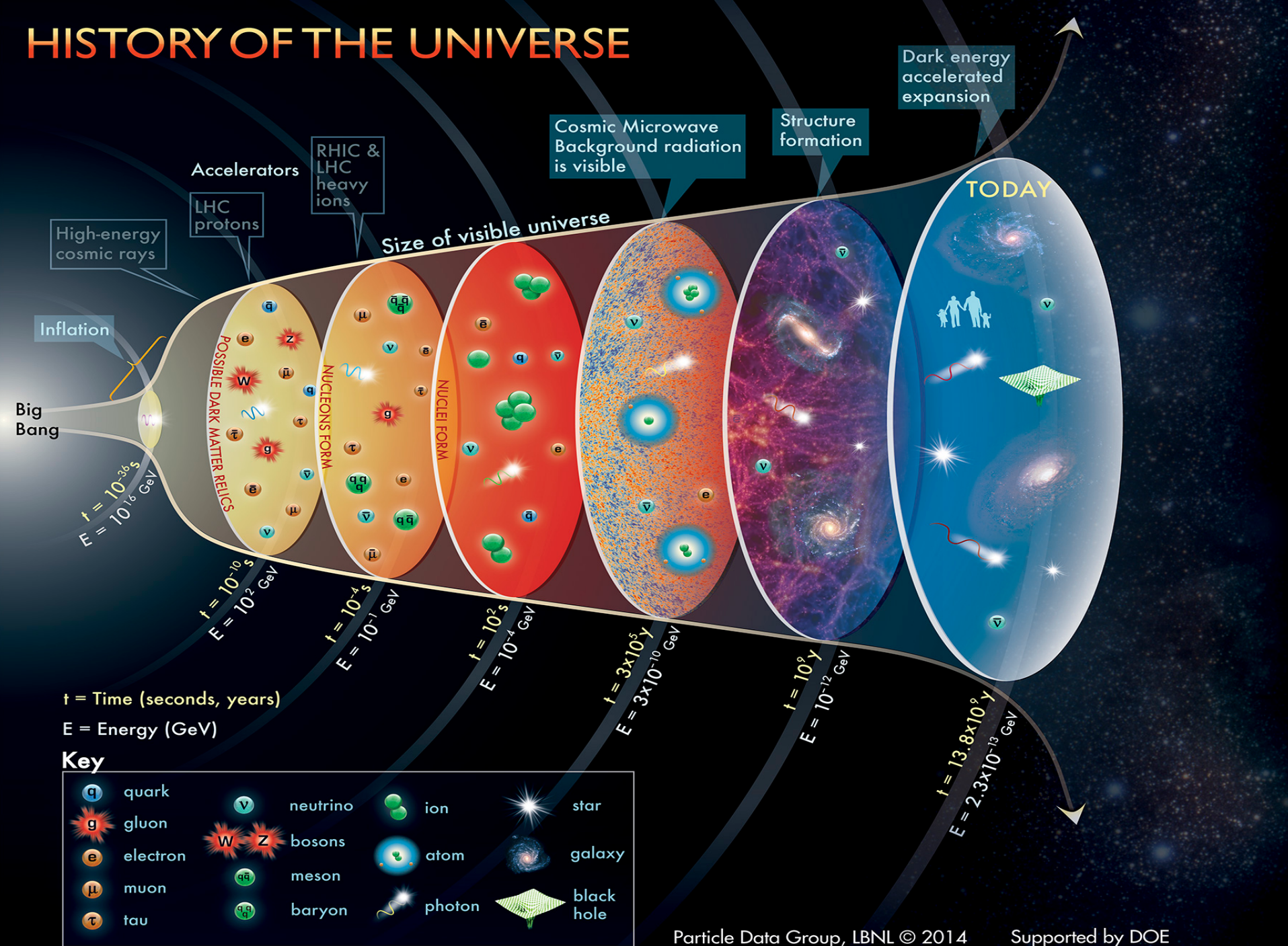
UNSW
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Asia-Pacific winter school and workshop on gravitation and cosmology 2020

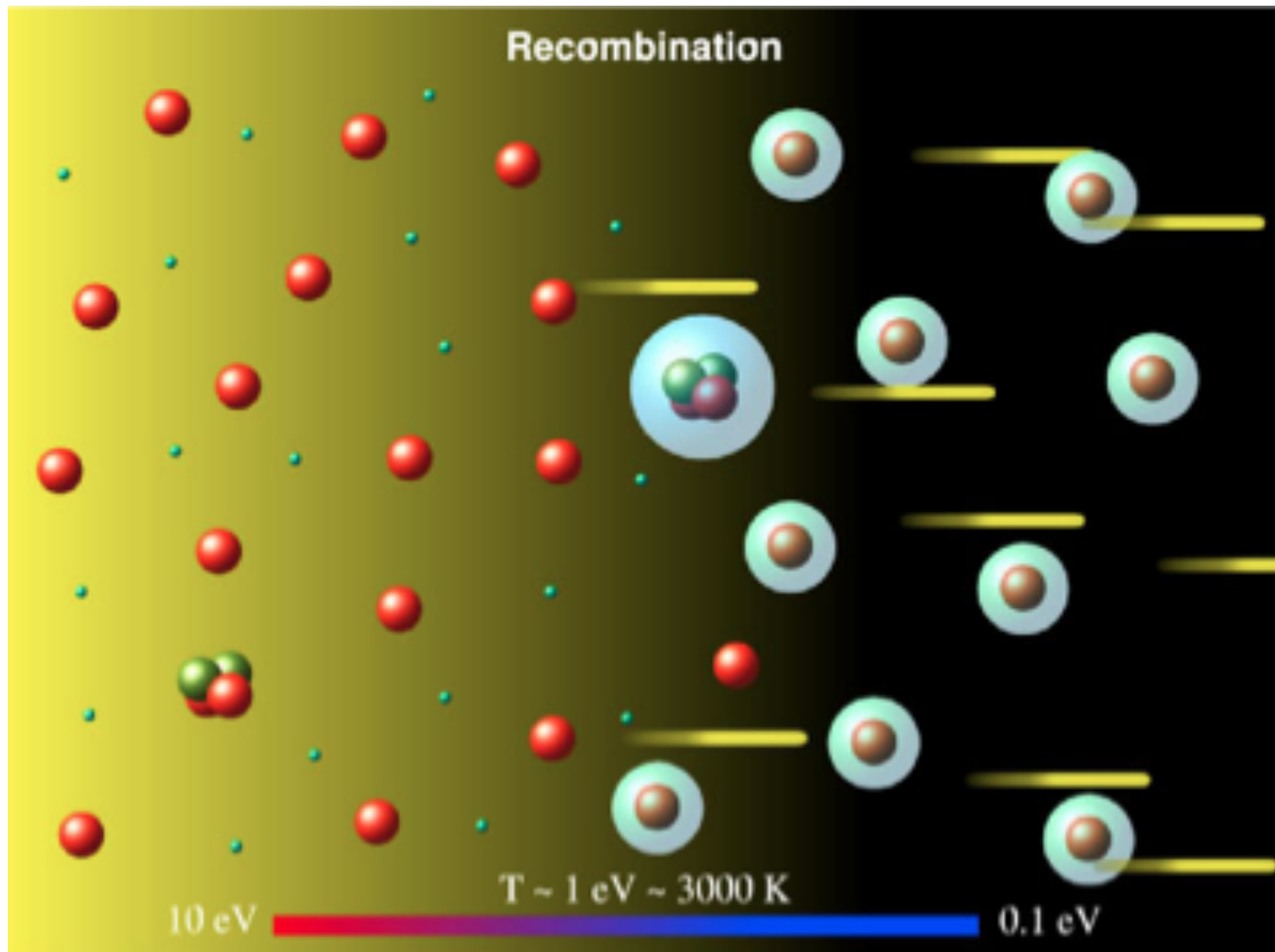
Institute for Basic Science, Daejeon

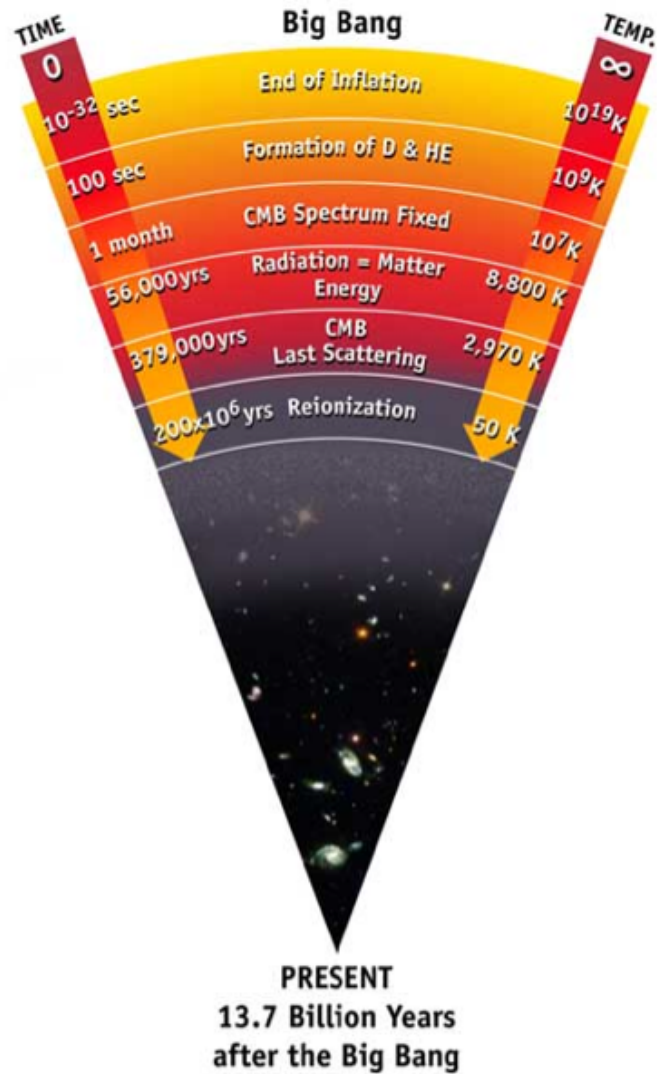
10th-14th February 2020

HISTORY OF THE UNIVERSE

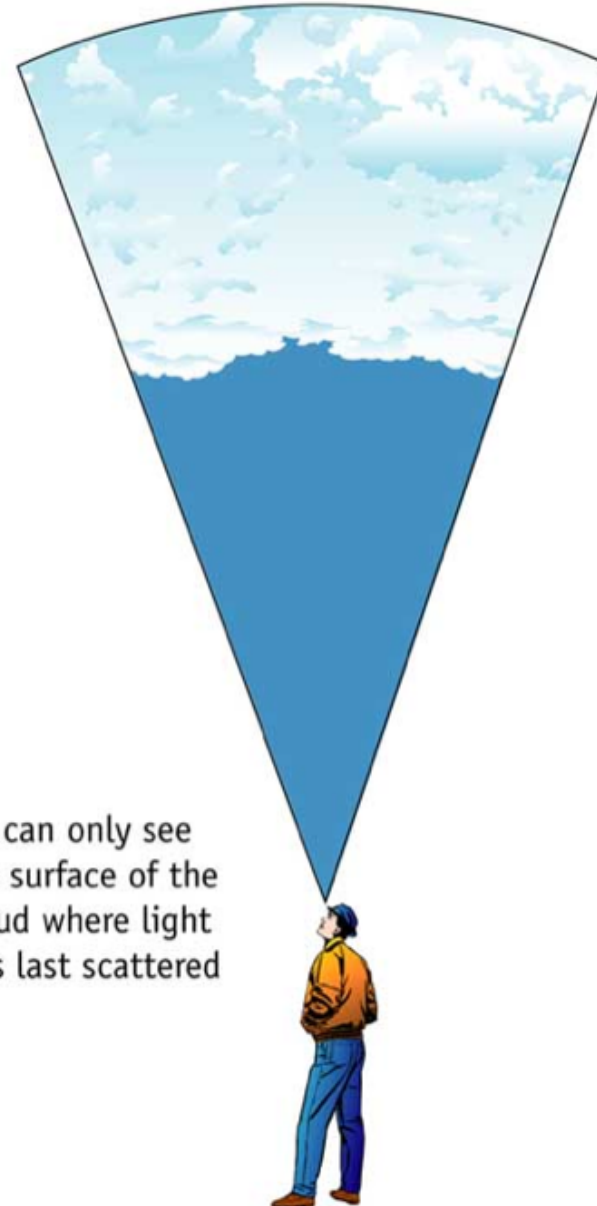


Recombination





The cosmic microwave background Radiation's "surface of last scatter" is analogous to the light coming through the clouds to our eye on a cloudy day.



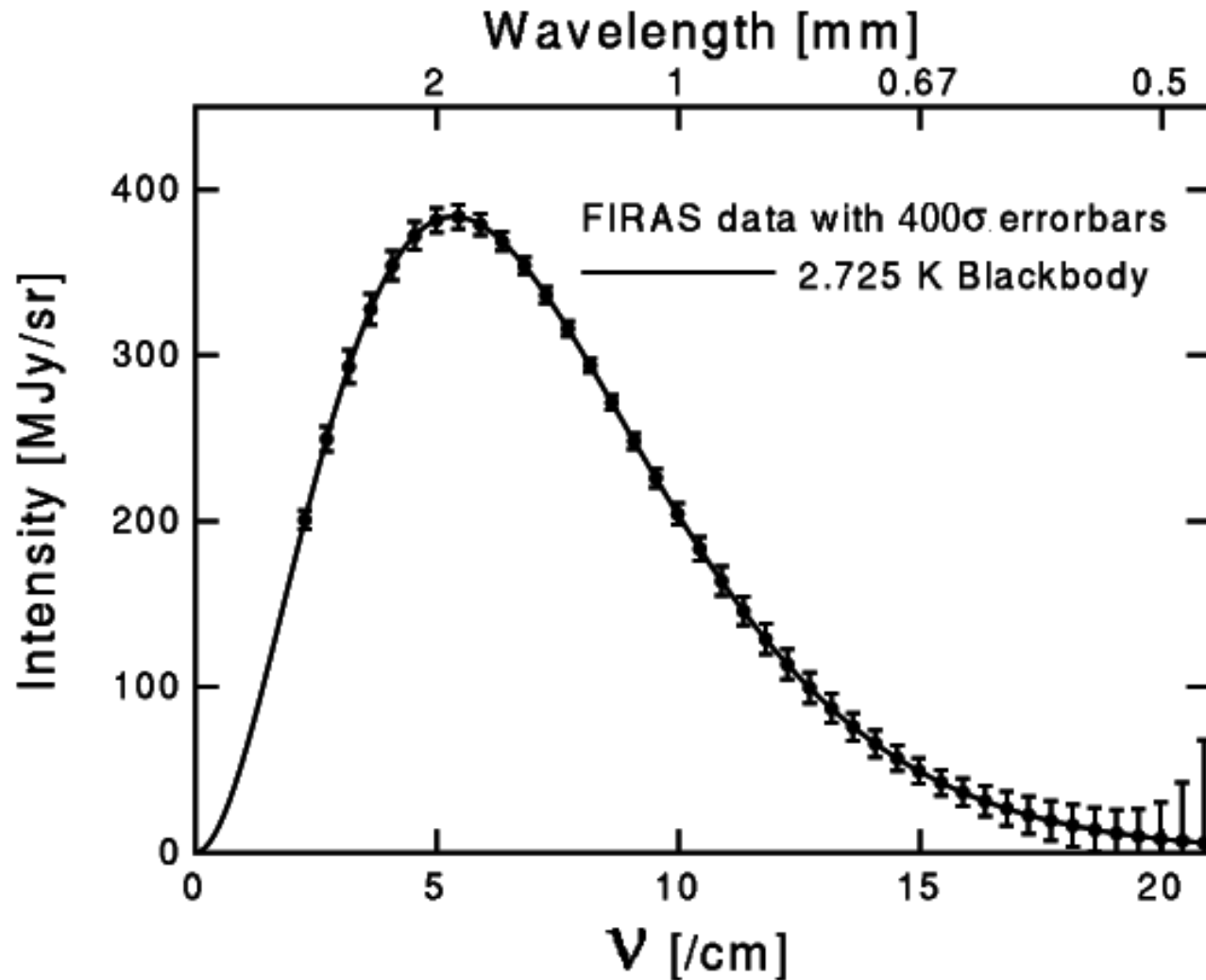
Plan of the lectures

- I. The CMB in a homogeneous Universe
- II. The physics of CMB anisotropies
- III. CMB: from observation to constraining cosmology

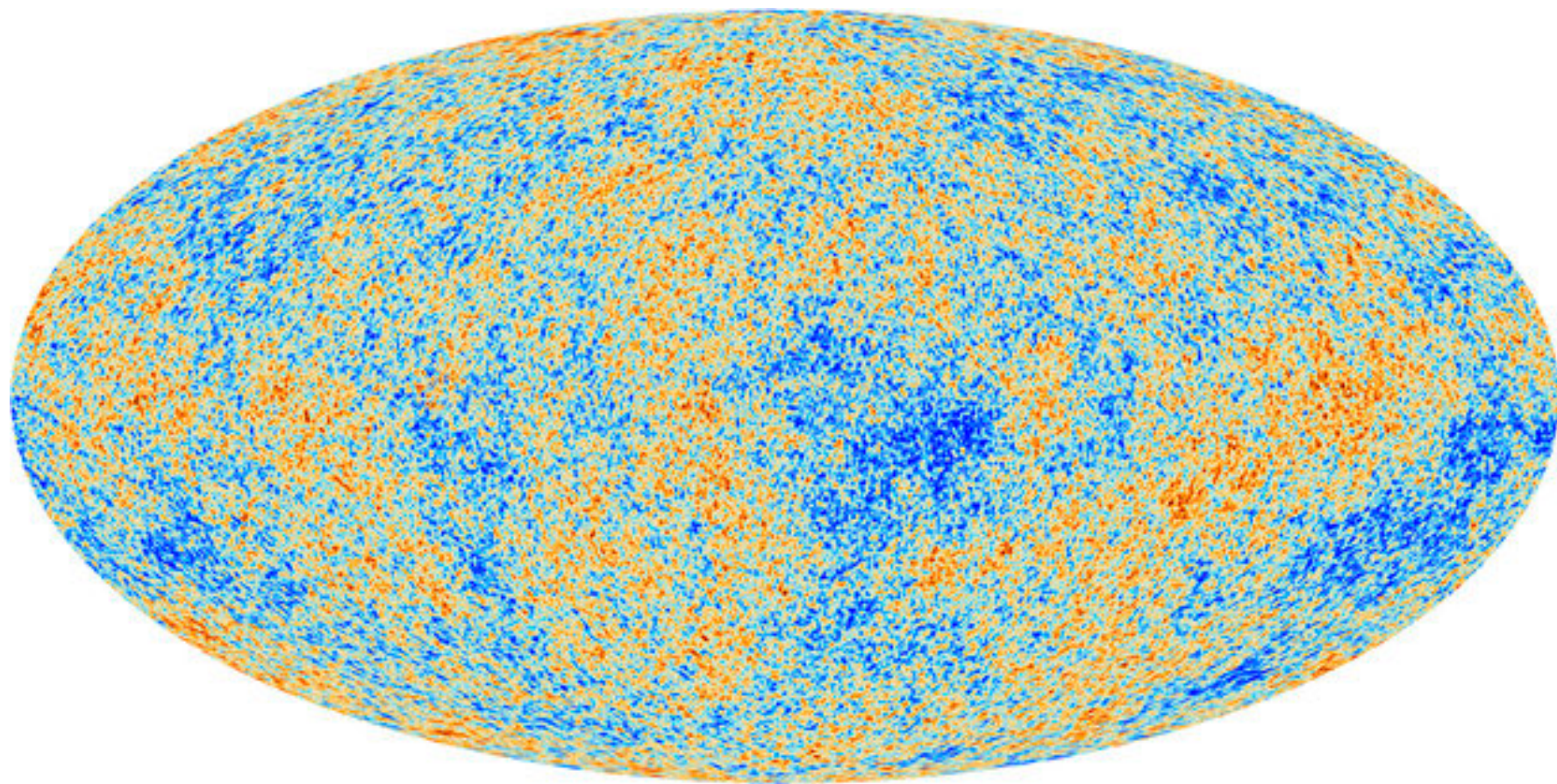
Useful resources

- Scott Dodelson:
Modern Cosmology, Academic Press (2003)
- Daniel Baumann:
<http://cosmology.amsterdam/education/cosmology/>
<http://cosmology.amsterdam/education/advanced-cosmology/>
- Anthony Challinor and Hiranya Peiris:
<https://arxiv.org/pdf/0903.5158.pdf>

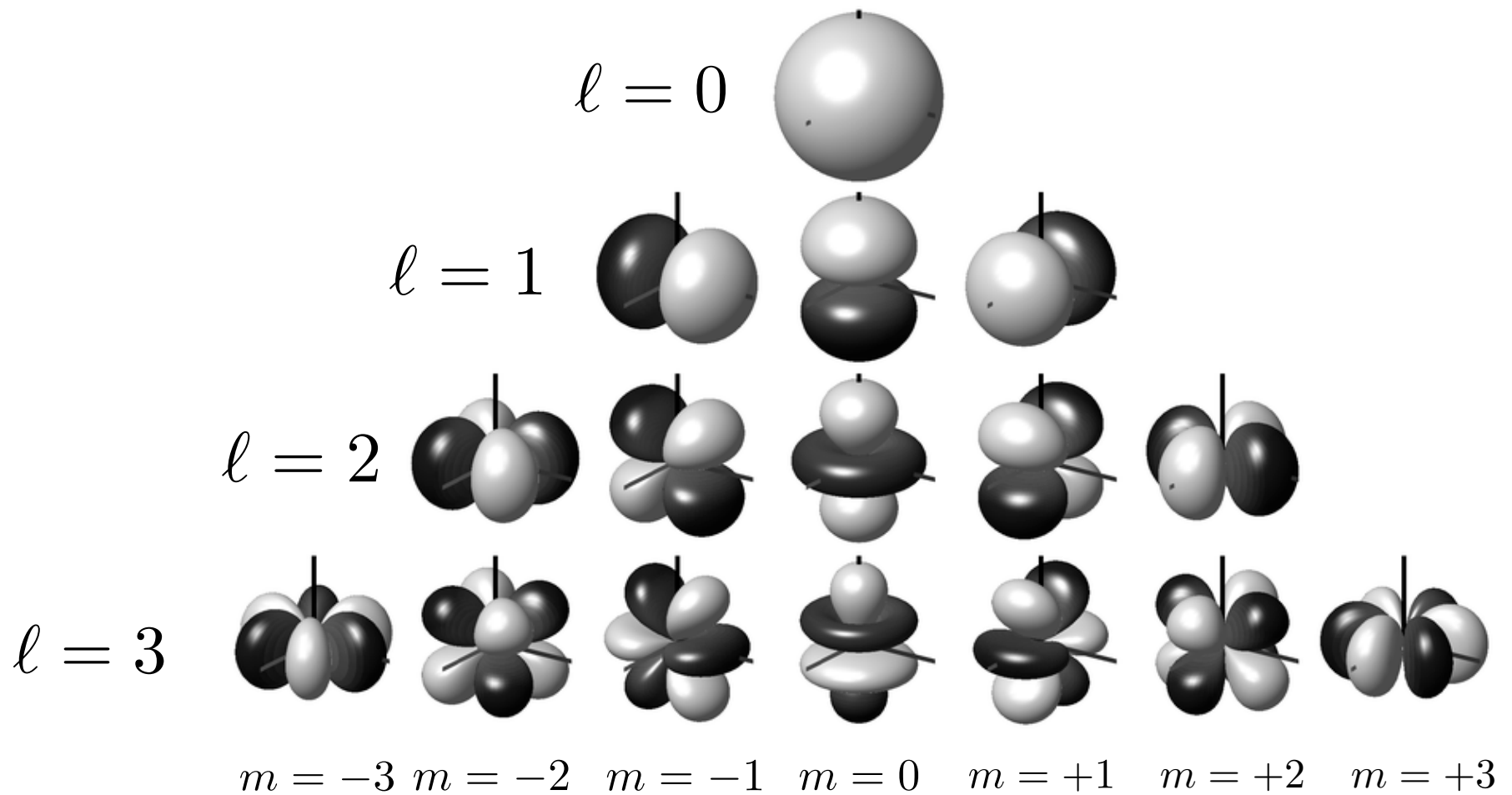
CMB frequency spectrum (FIRAS)



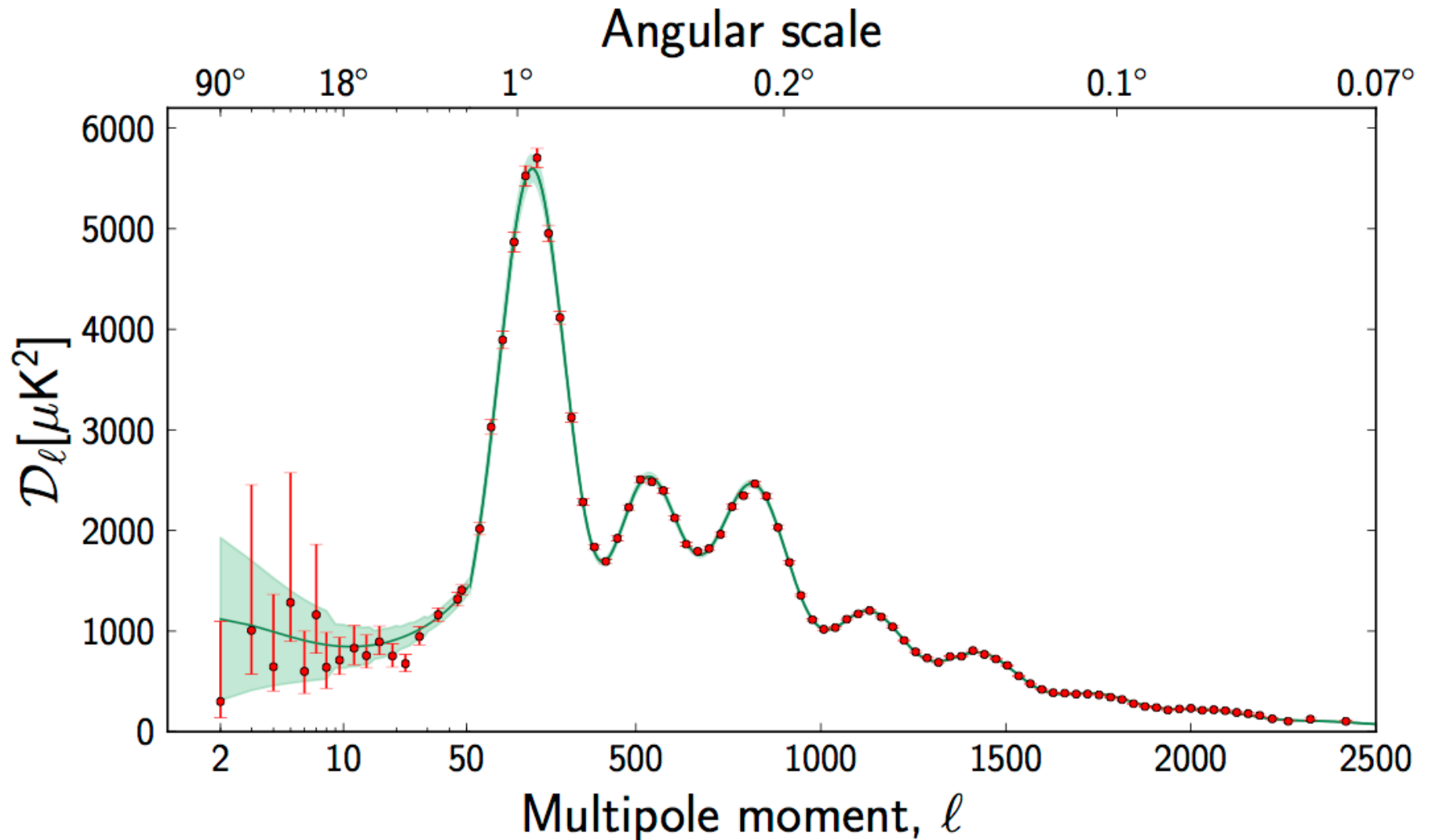
Planck map of CMB
temperature anisotropies



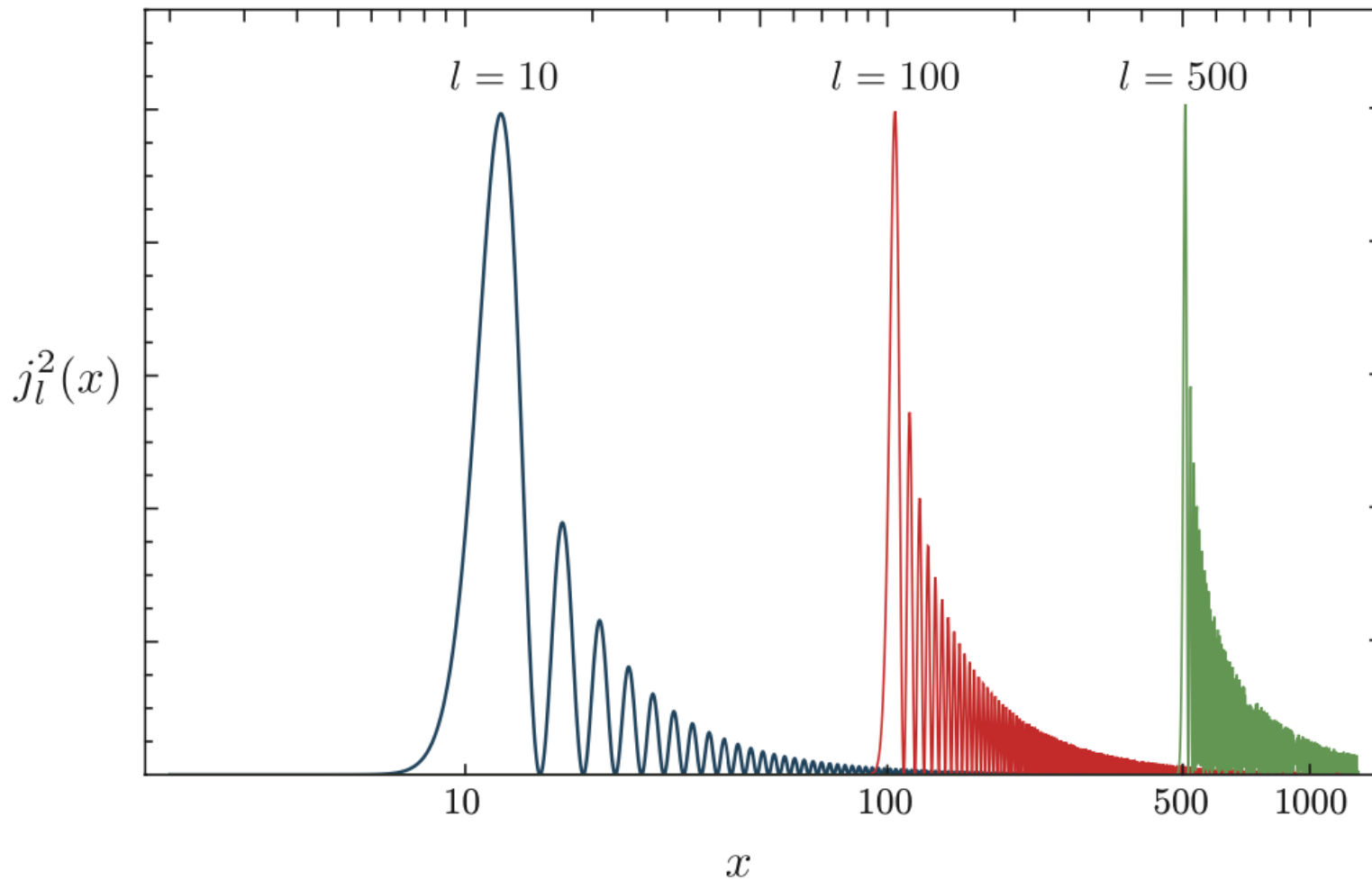
Spherical harmonics



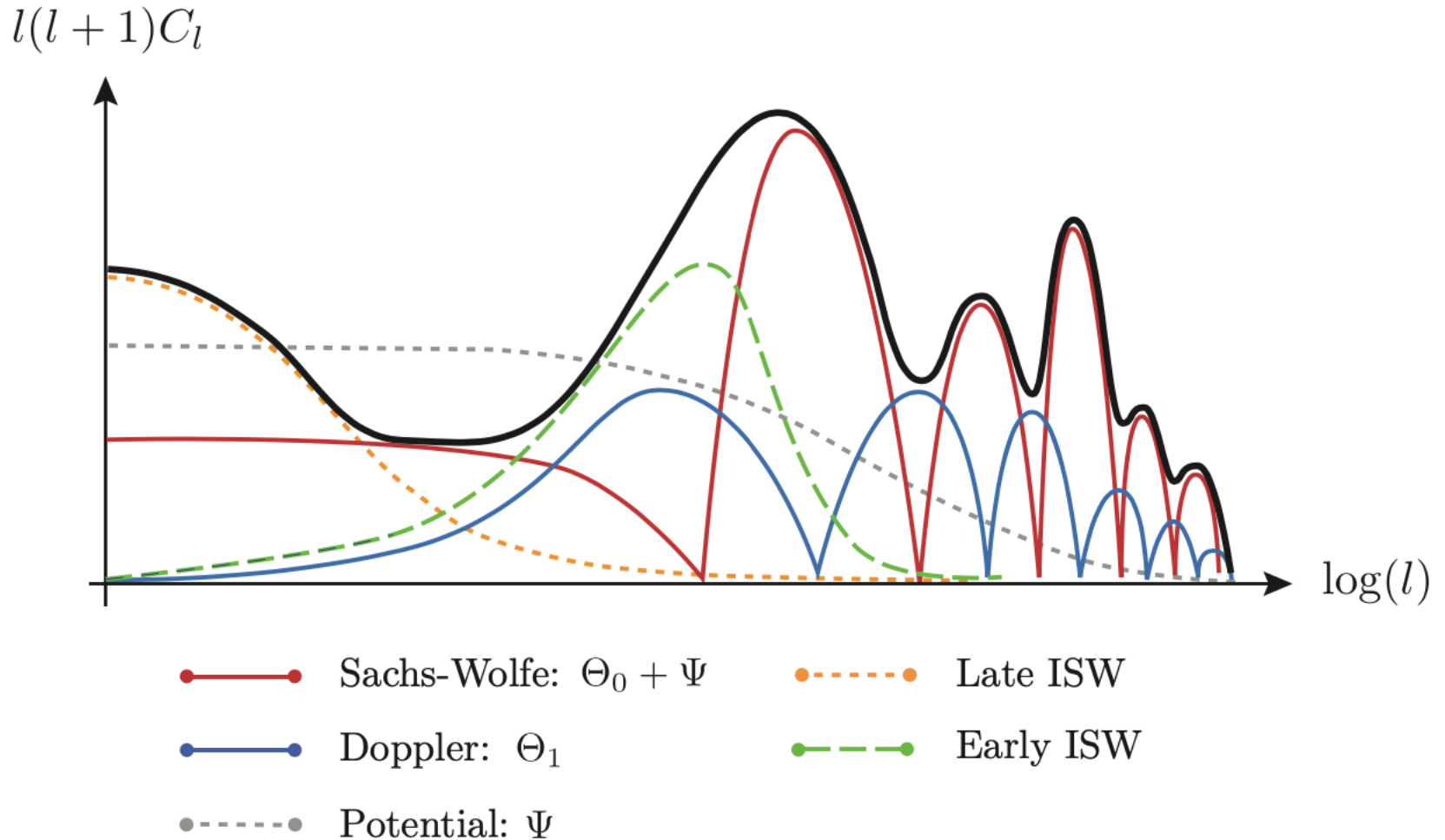
Planck angular power spectrum



Spherical Bessel functions



Individual contributions to the C_ℓ s



Diffusion damping

