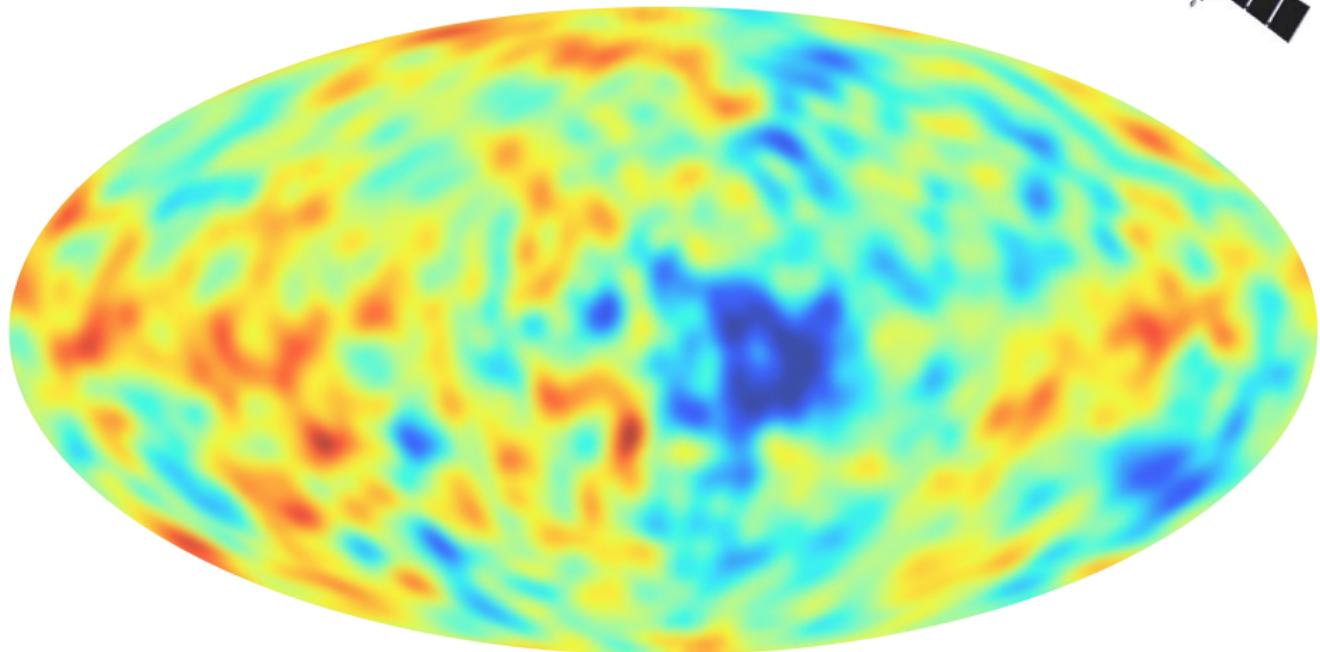
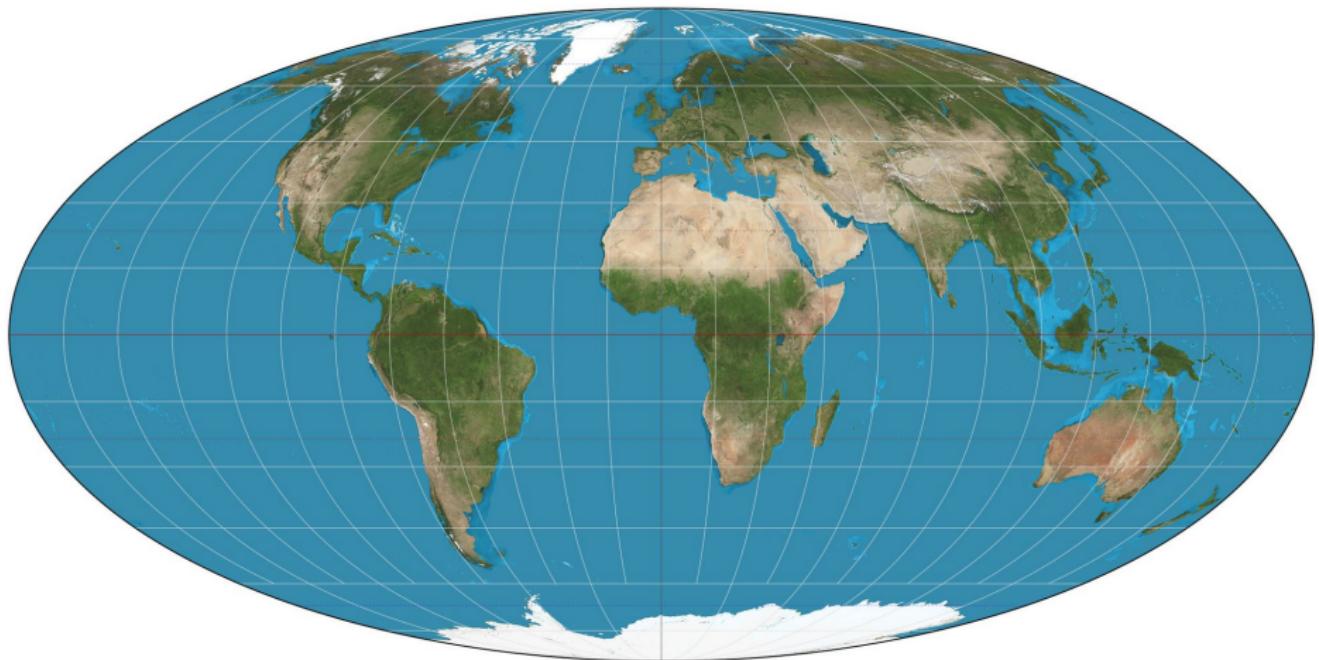
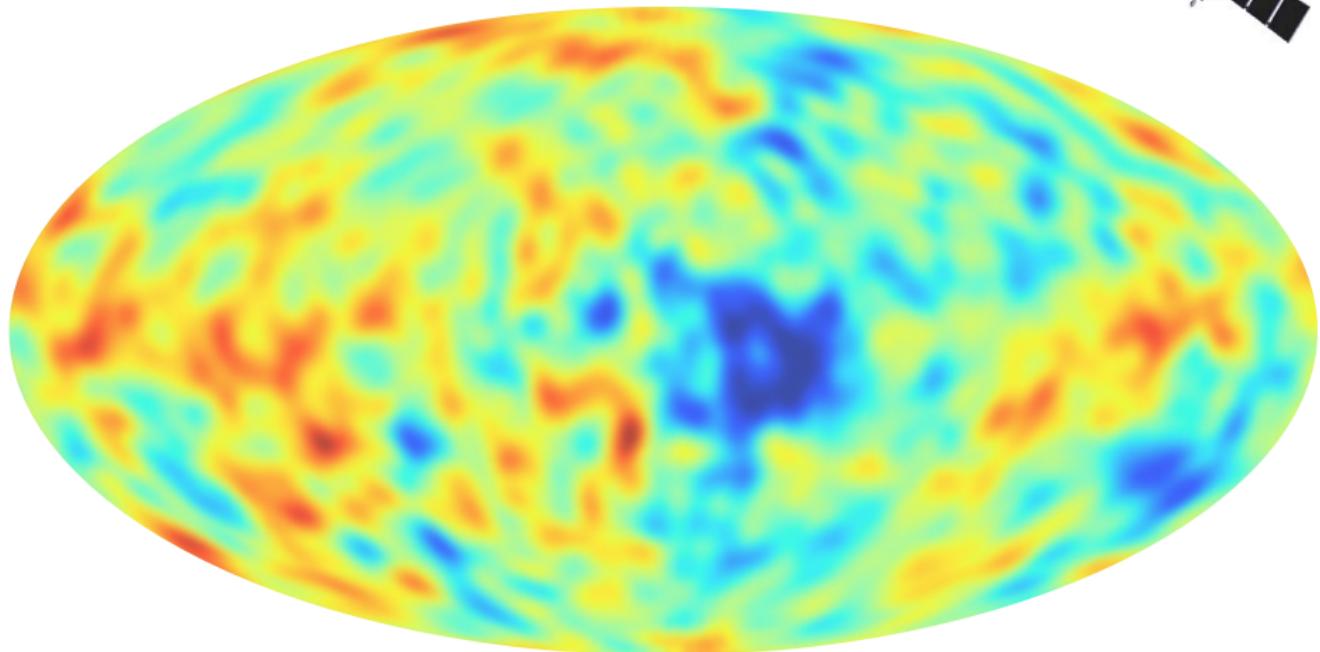


Cosmic Microwave Background (COBE 1992)

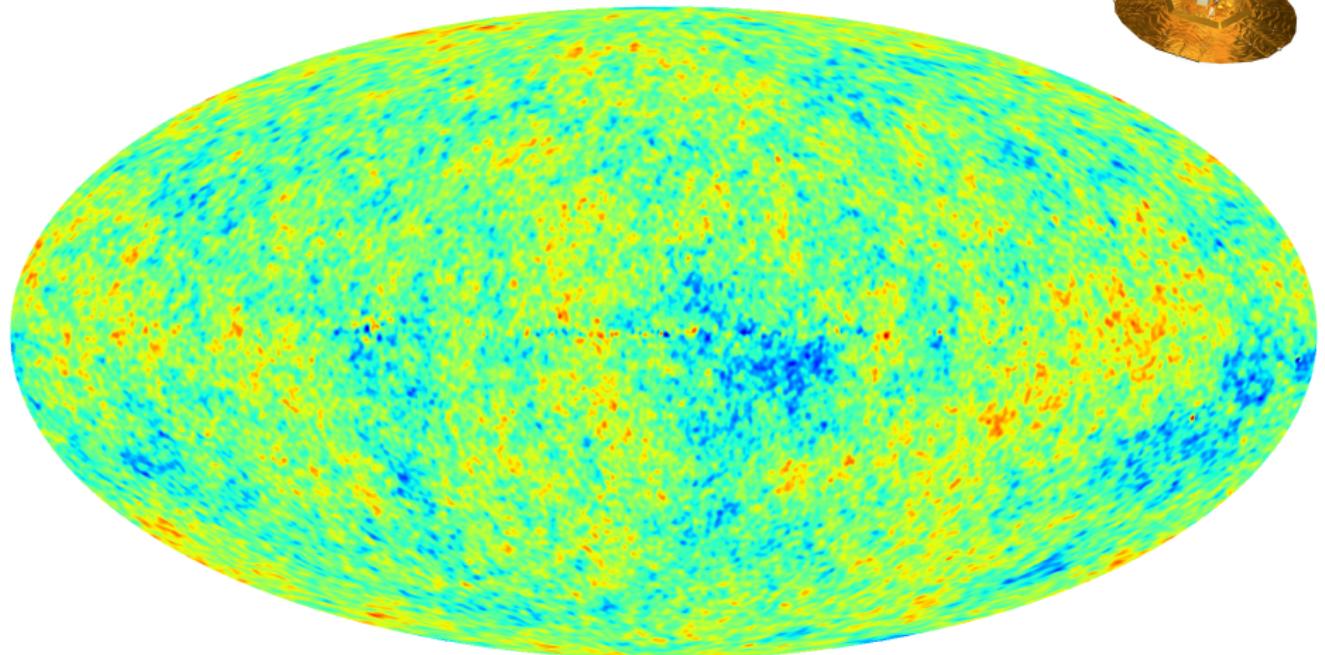




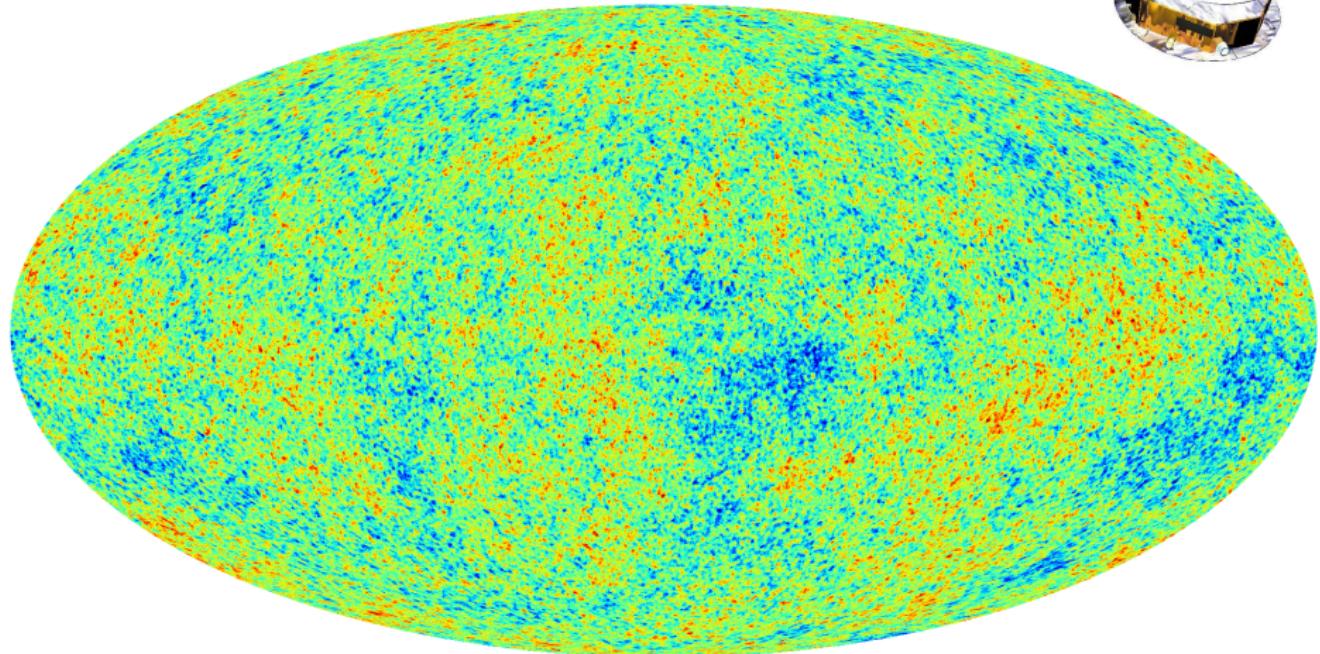
Cosmic Microwave Background (COBE 1992)

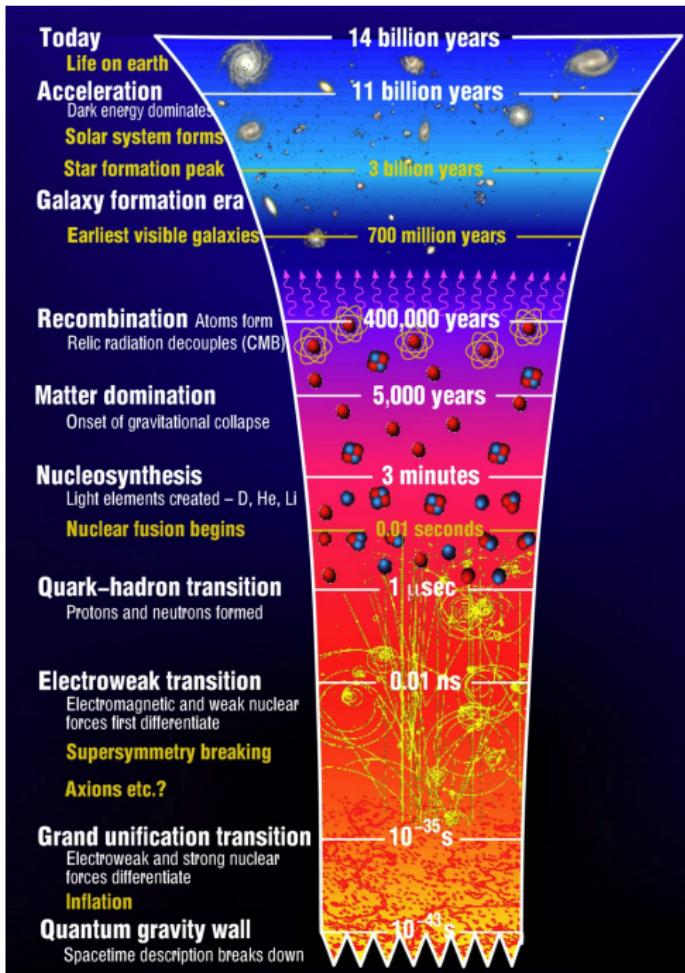


Cosmic Microwave Background (WMAP 2012)



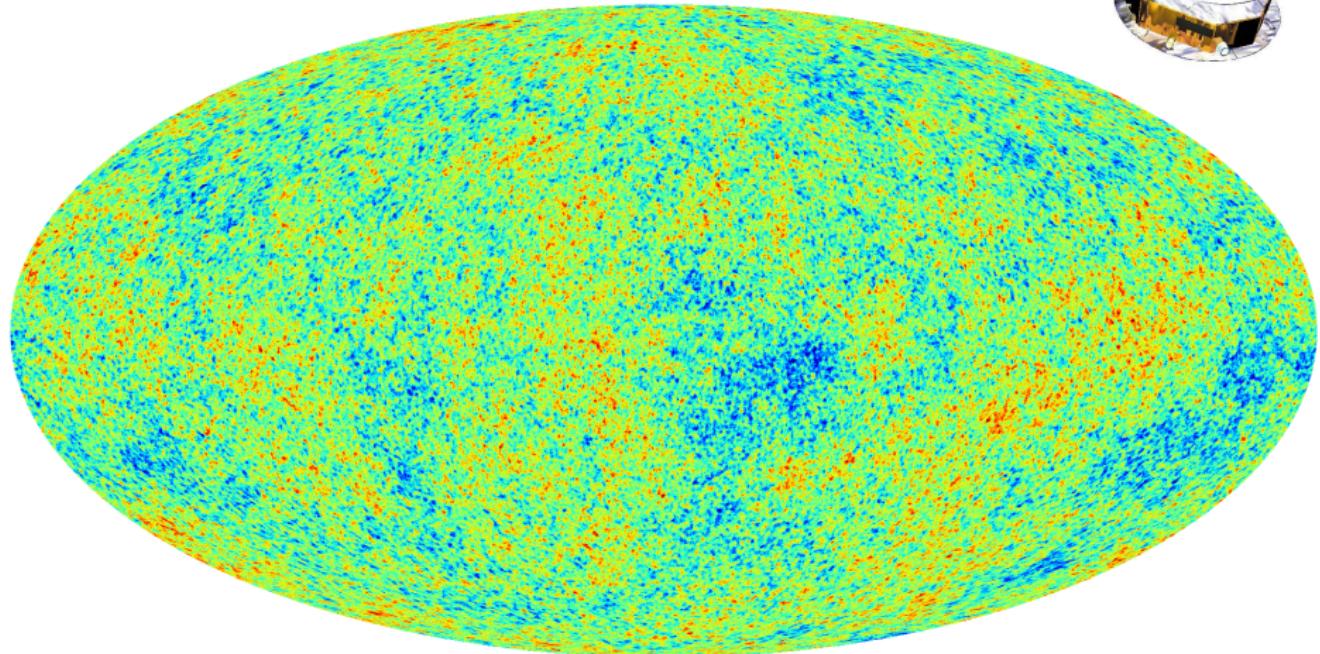
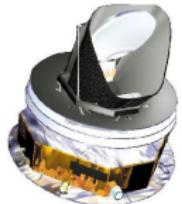
Cosmic Microwave Background (Planck 2015)





Source: CTC

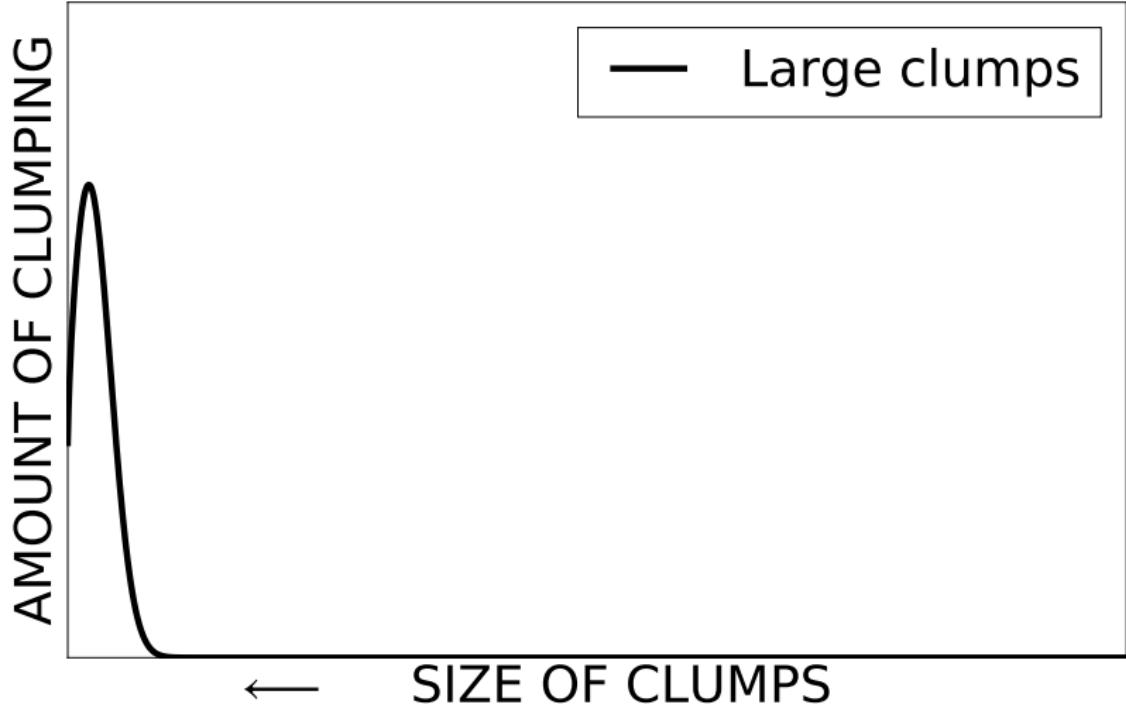
Cosmic Microwave Background (Planck 2015)



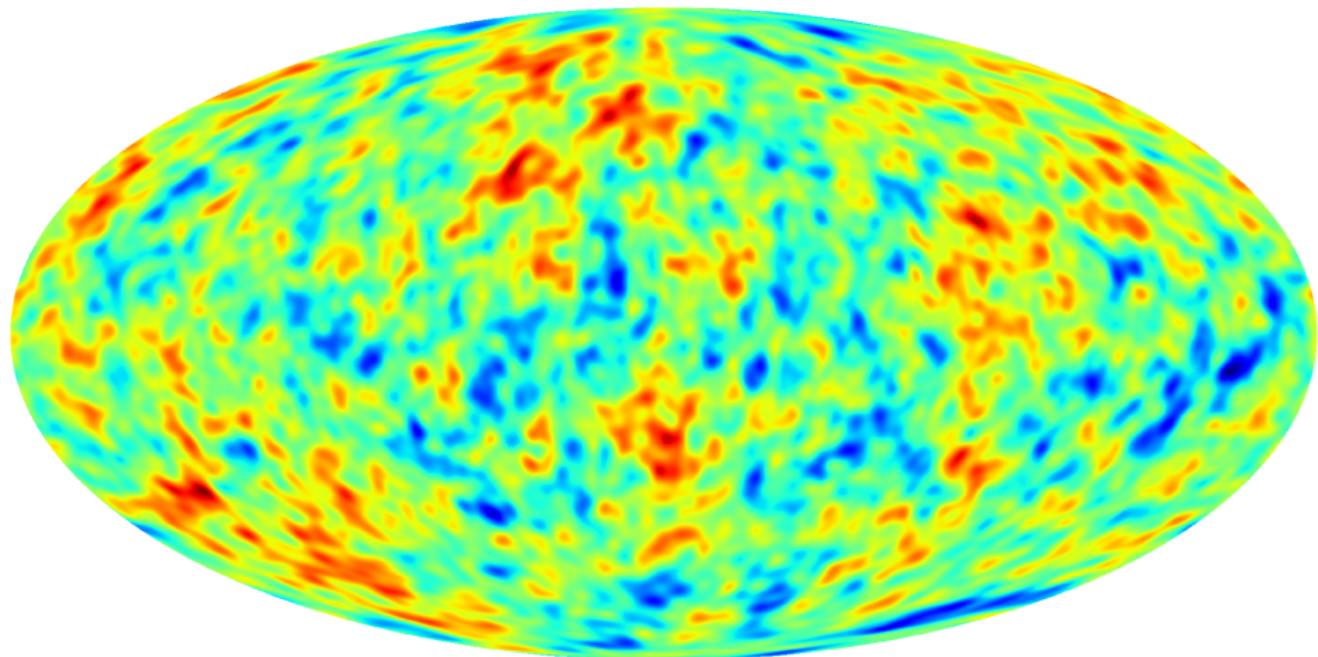
AMOUNT OF CLUMPING

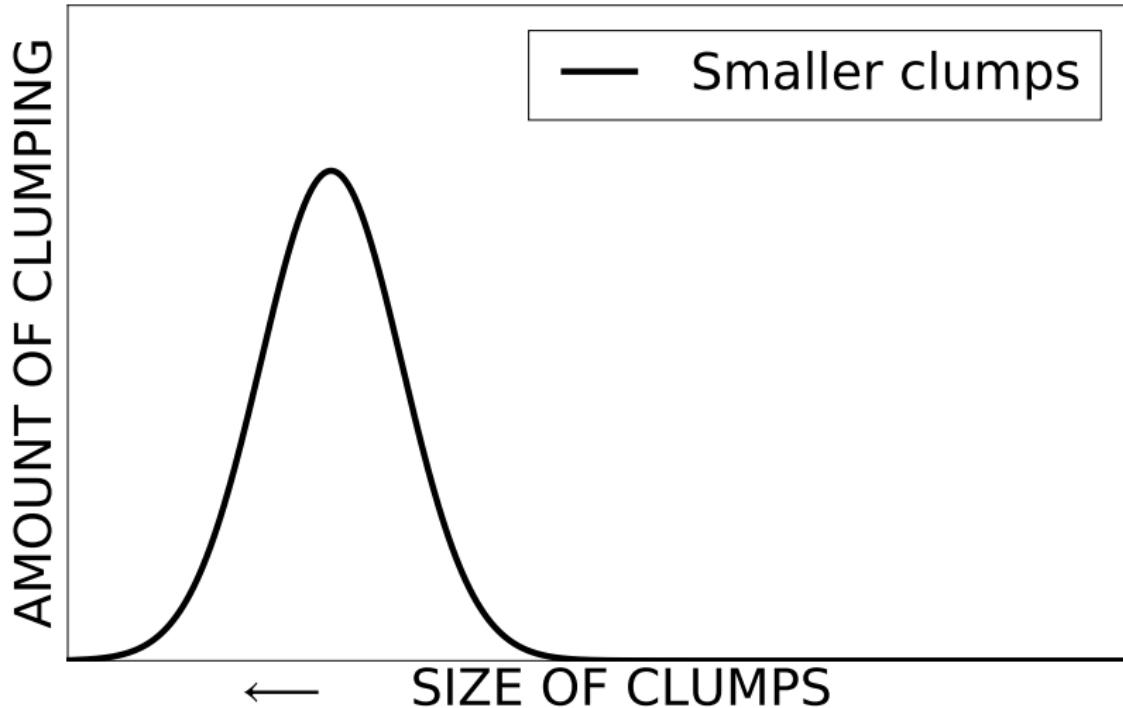


SIZE OF CLUMPS

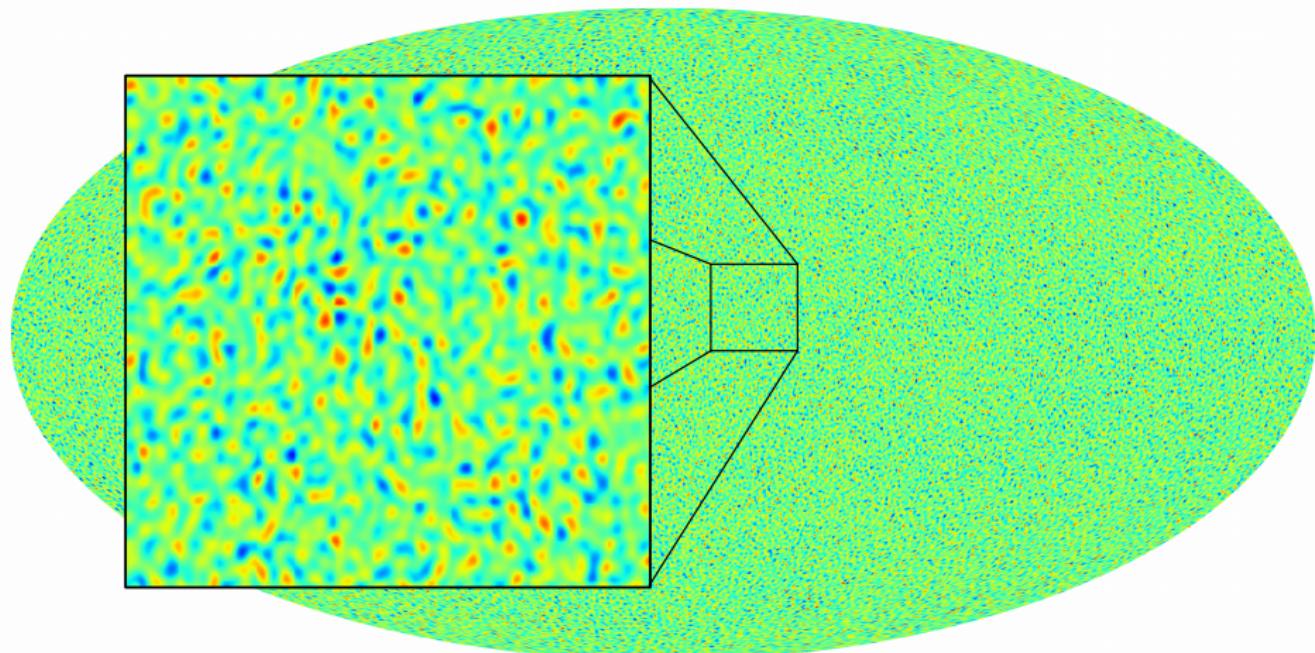


Large clumps

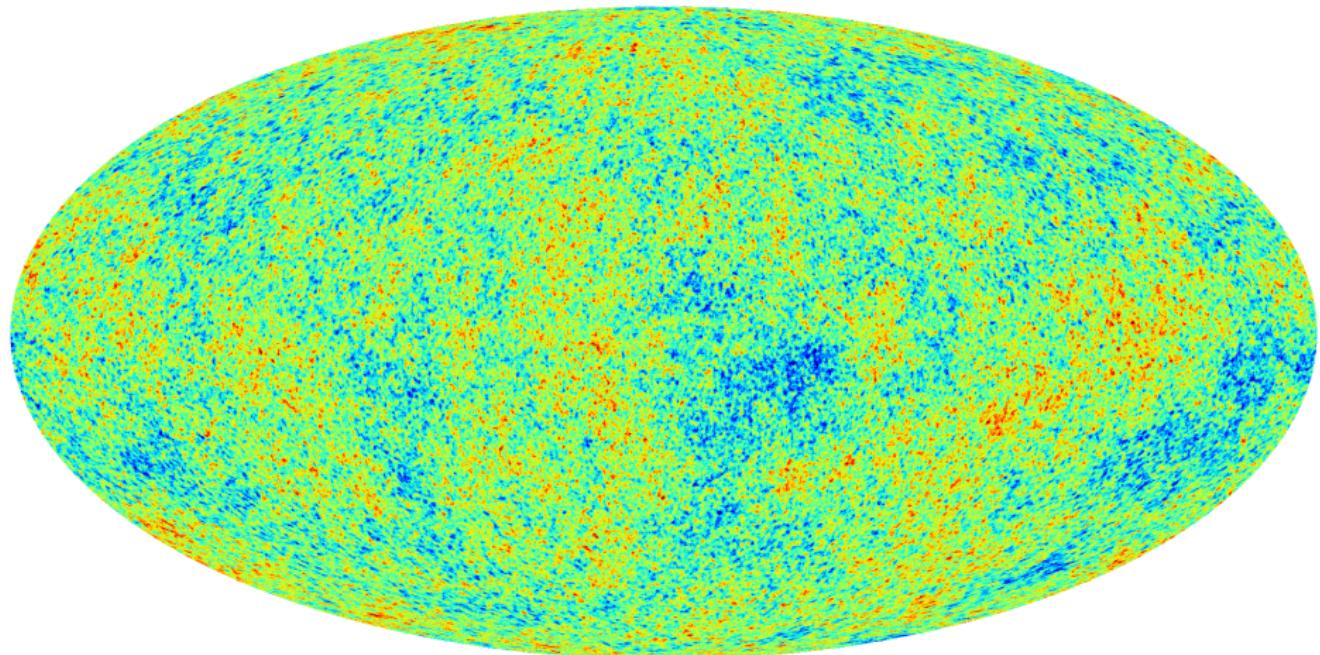




Smaller clumps



Cosmic Microwave Background (Planck 2015)

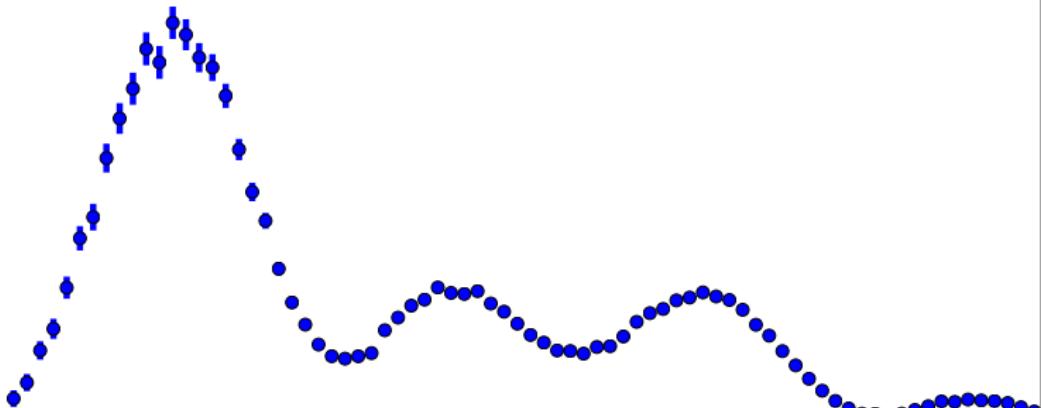


AMOUNT OF CLUMPING

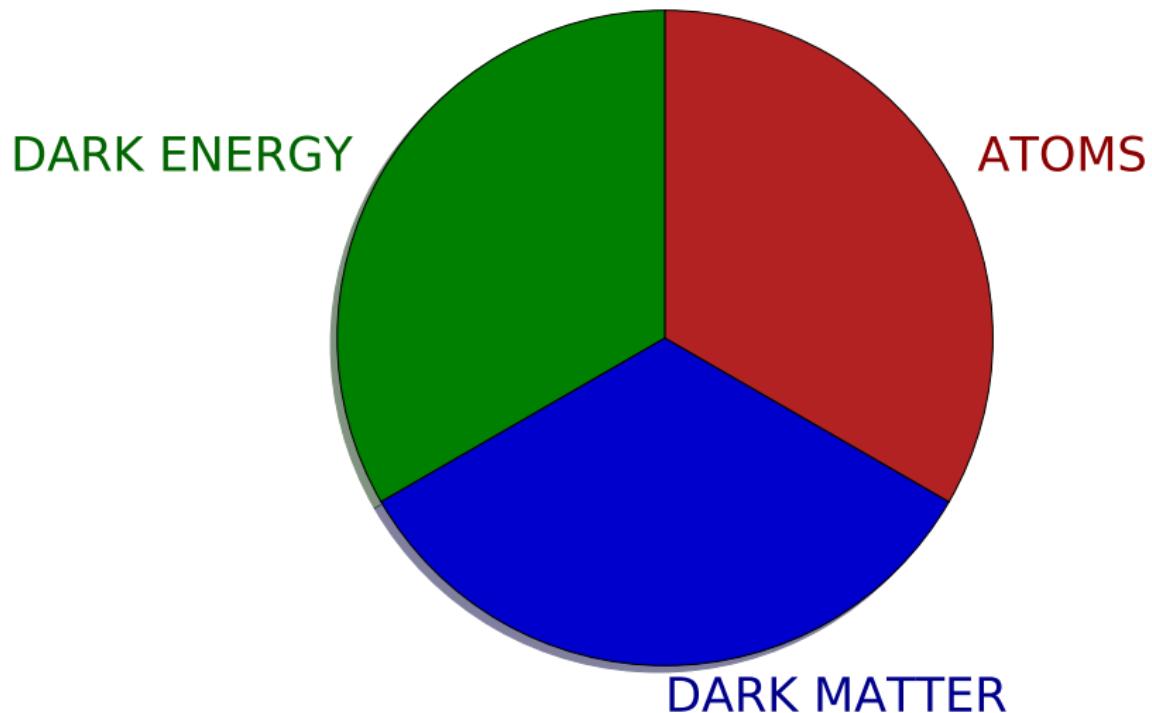


SIZE OF CLUMPS

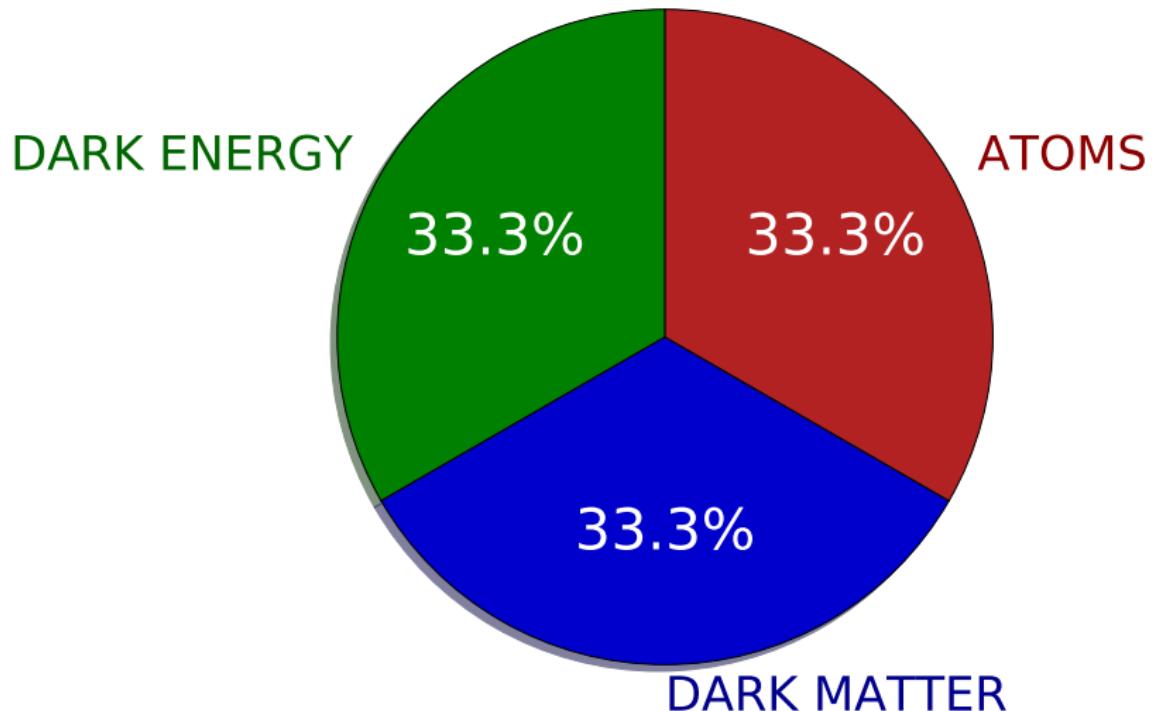
Data



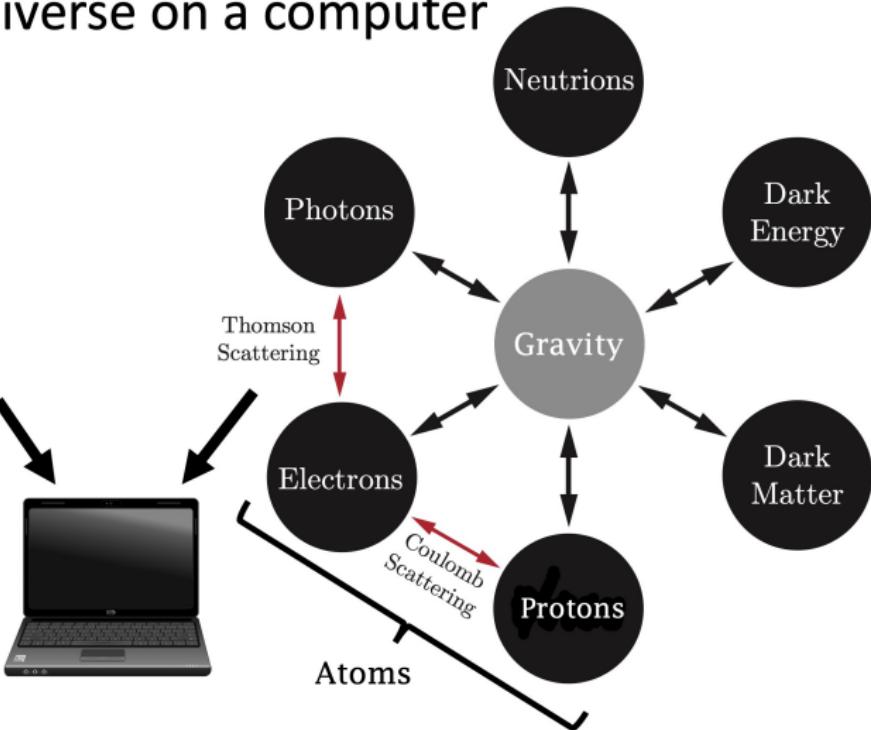
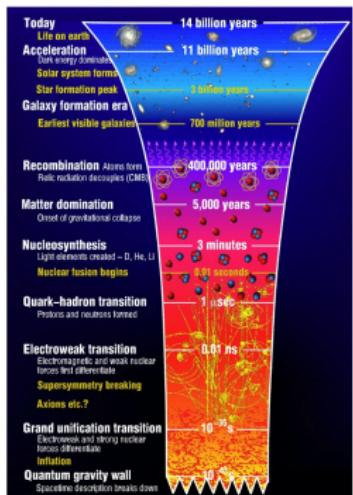
What is the Universe made of?



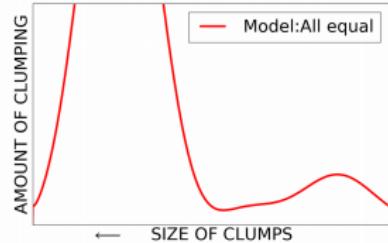
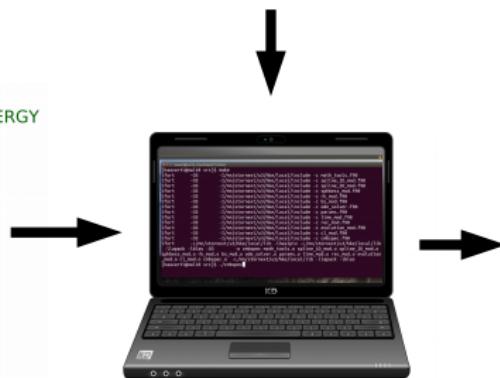
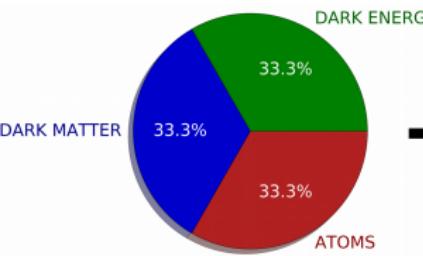
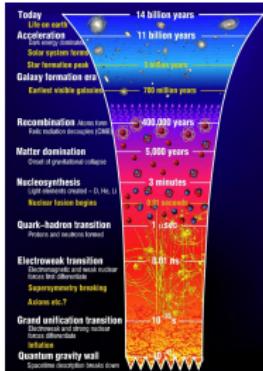
Model: All equal



Simulate the universe on a computer



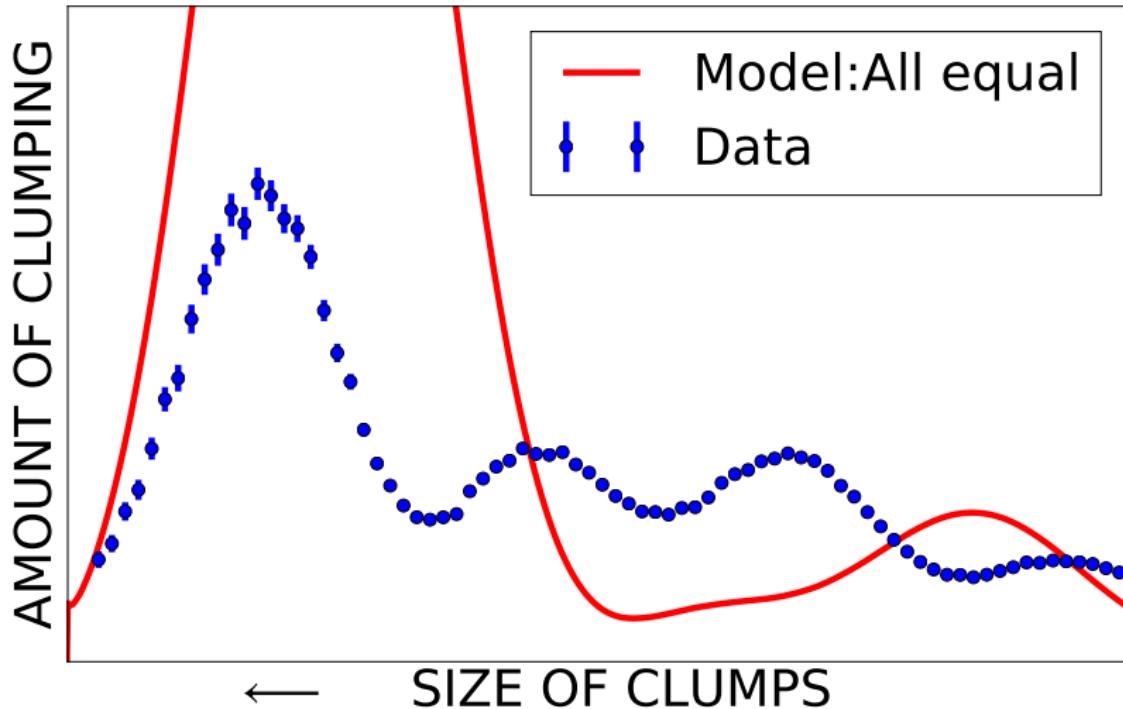
Cosmology



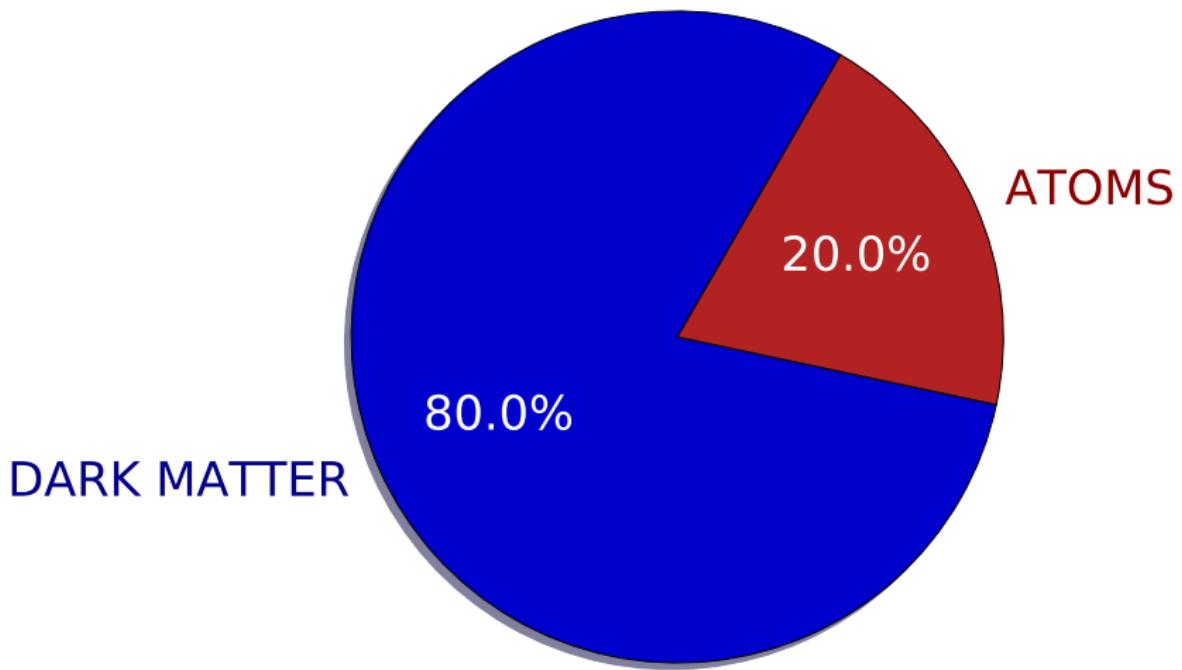
Model

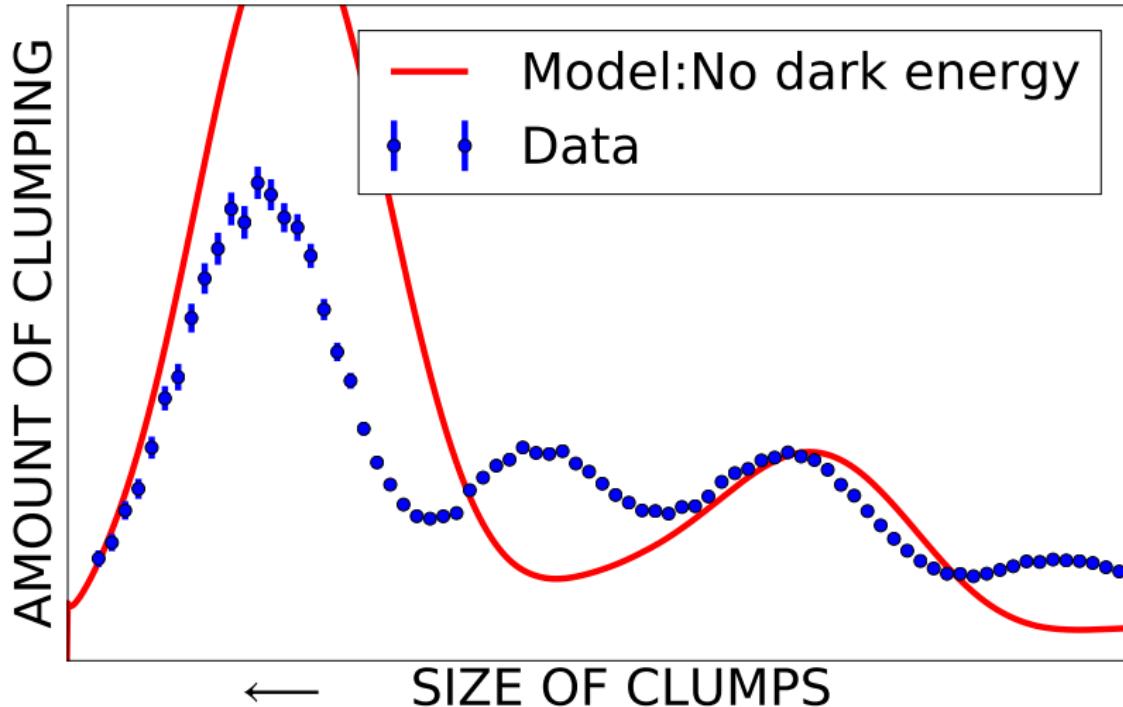
Simulation

Prediction

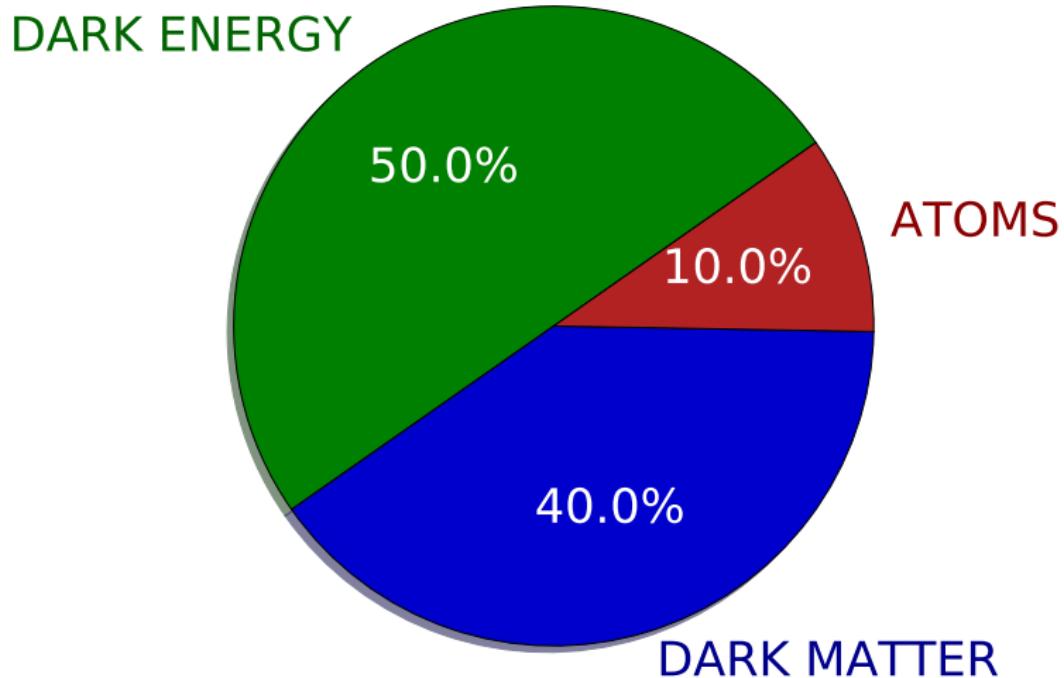


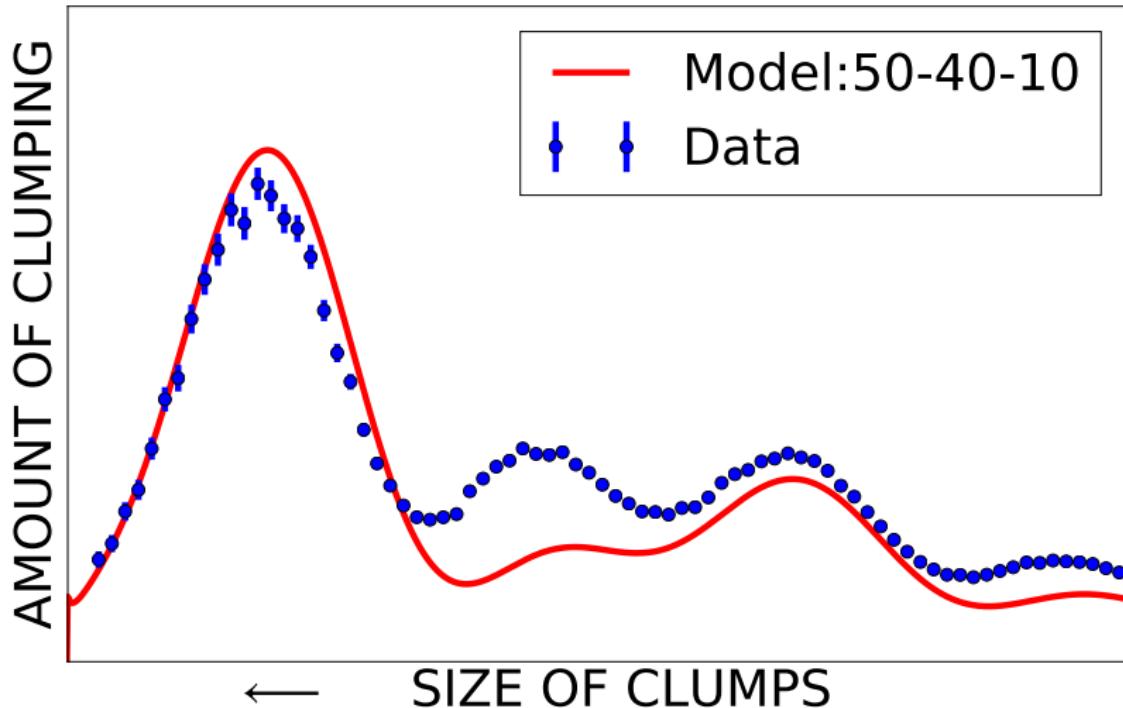
Model: No dark energy





Model:50-40-10





Model: Best fit

DARK ENERGY

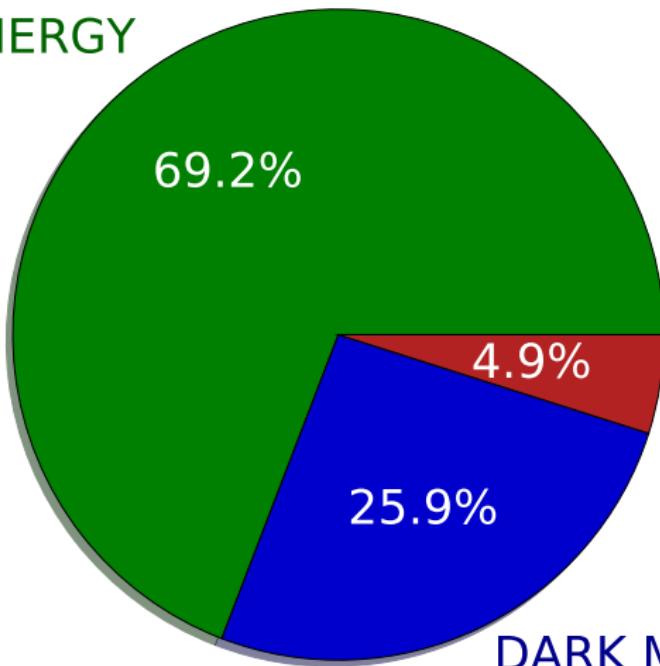
69.2%

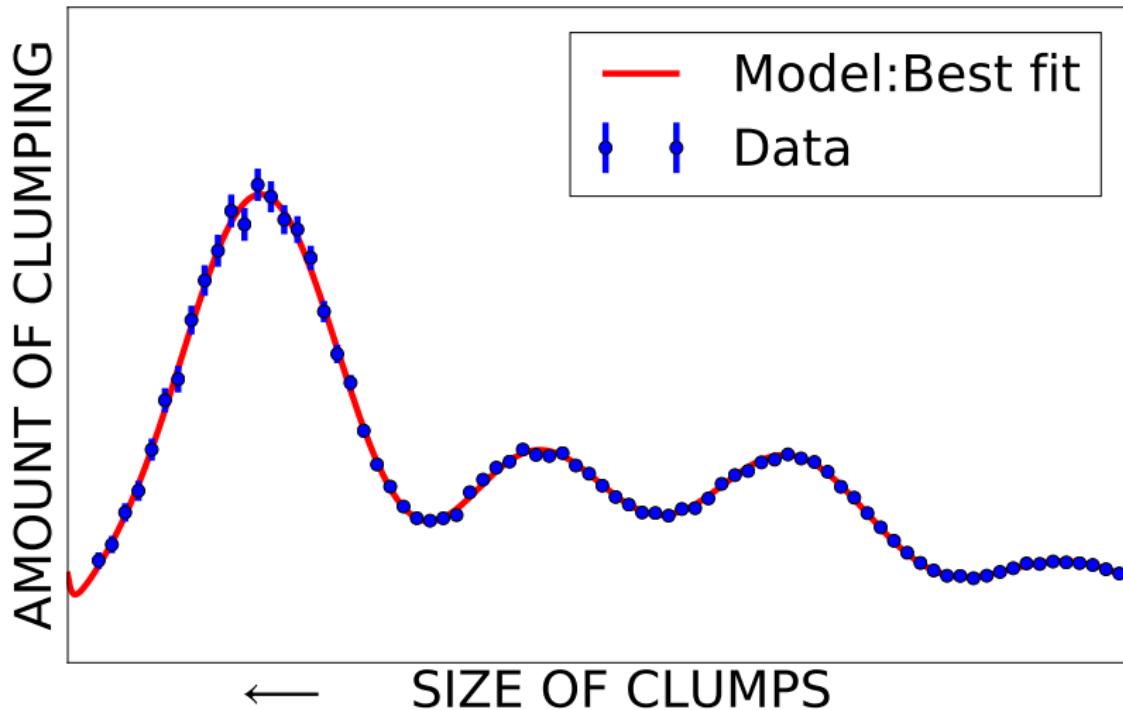
4.9%

ATOMS

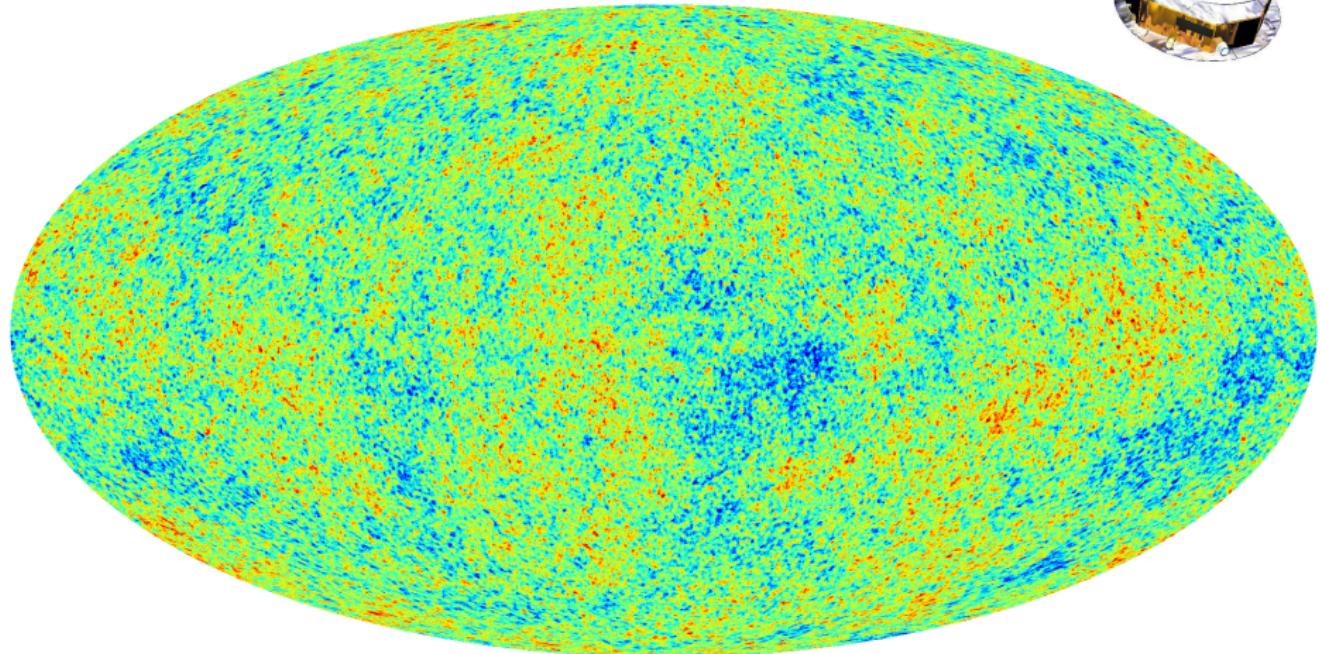
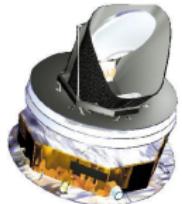
25.9%

DARK MATTER





Cosmic Microwave Background (Planck 2015)



Summary

