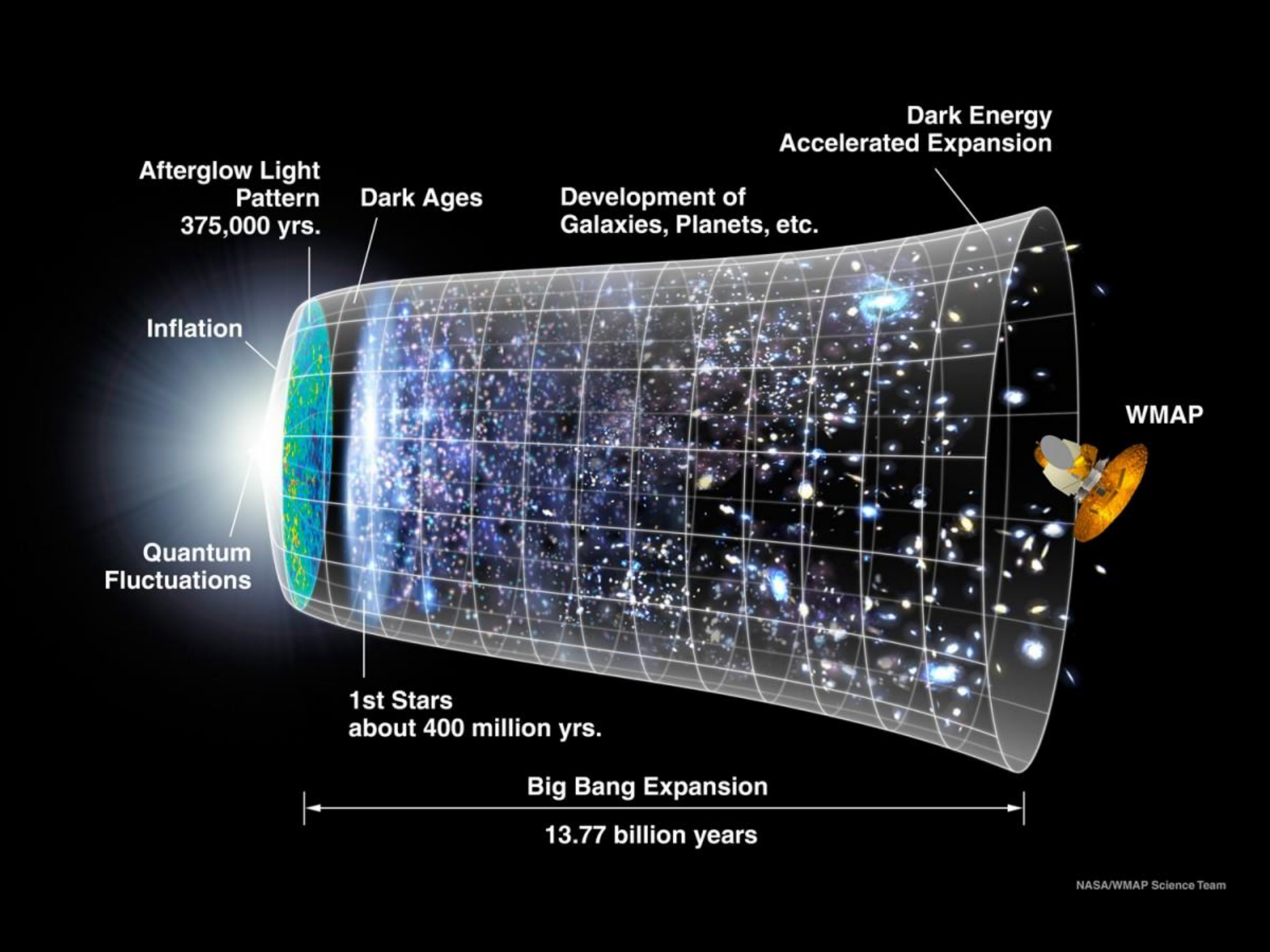
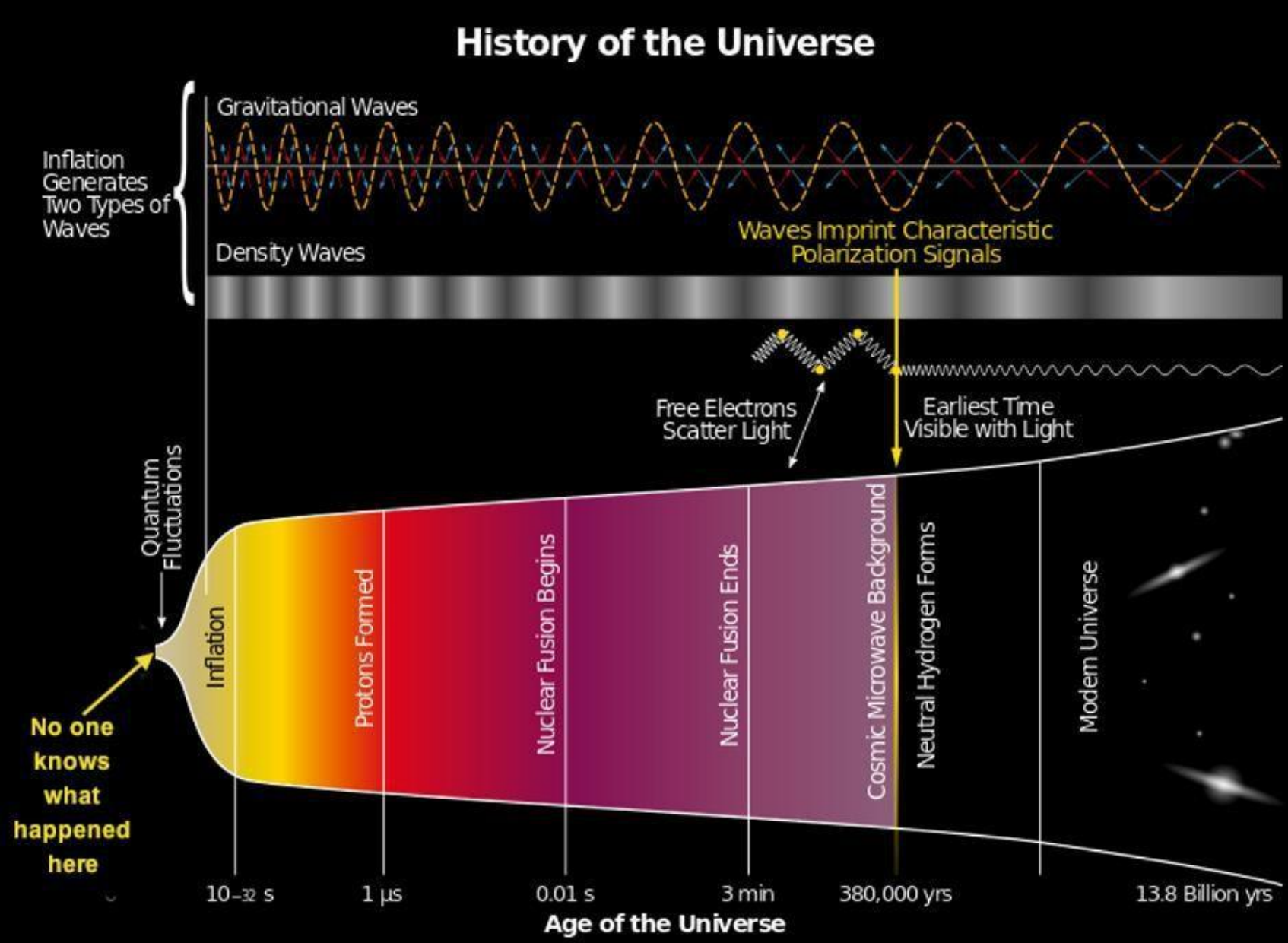
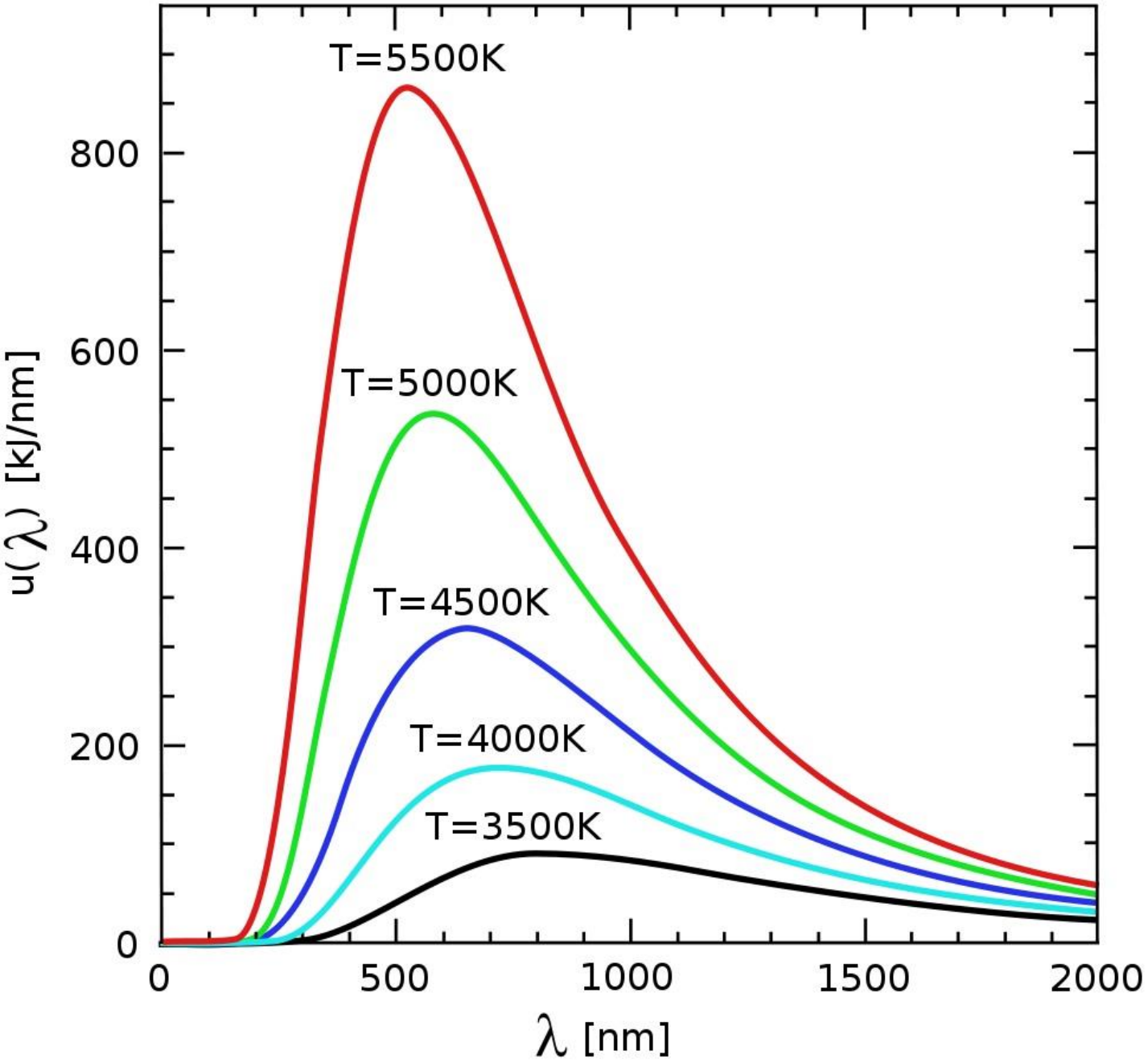
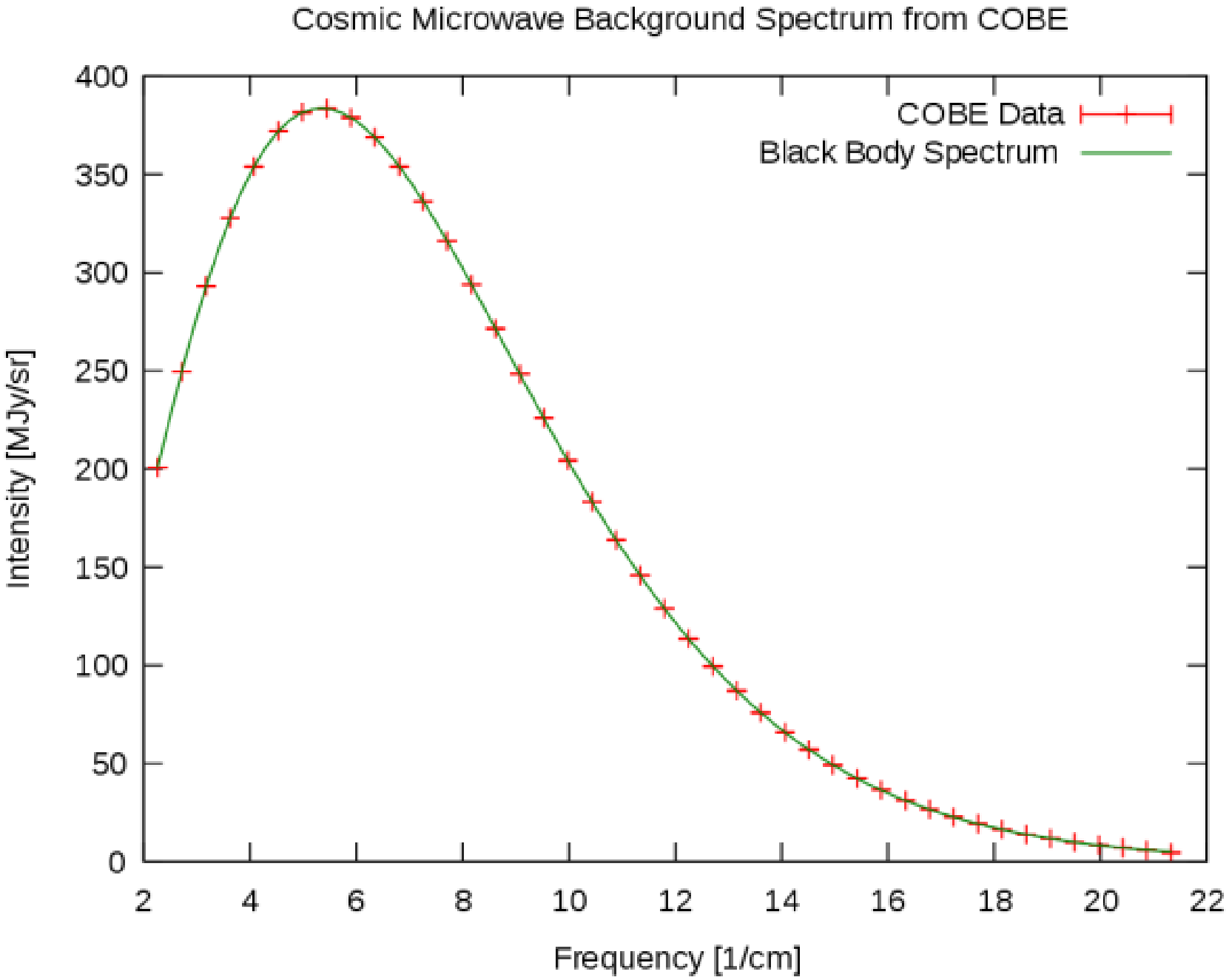

Dark Energy
Accelerated Expansion
Afterglow Light
Pattern
375,000 yrs.
Dark Ages
Development of
Galaxies, Planets, etc.
Inflation
WMAP
Quantum
Fluctuations
1st Stars
about 400 million yrs.
Big Bang Expansion
13.77 billion years
NASA/WMAP Science Team



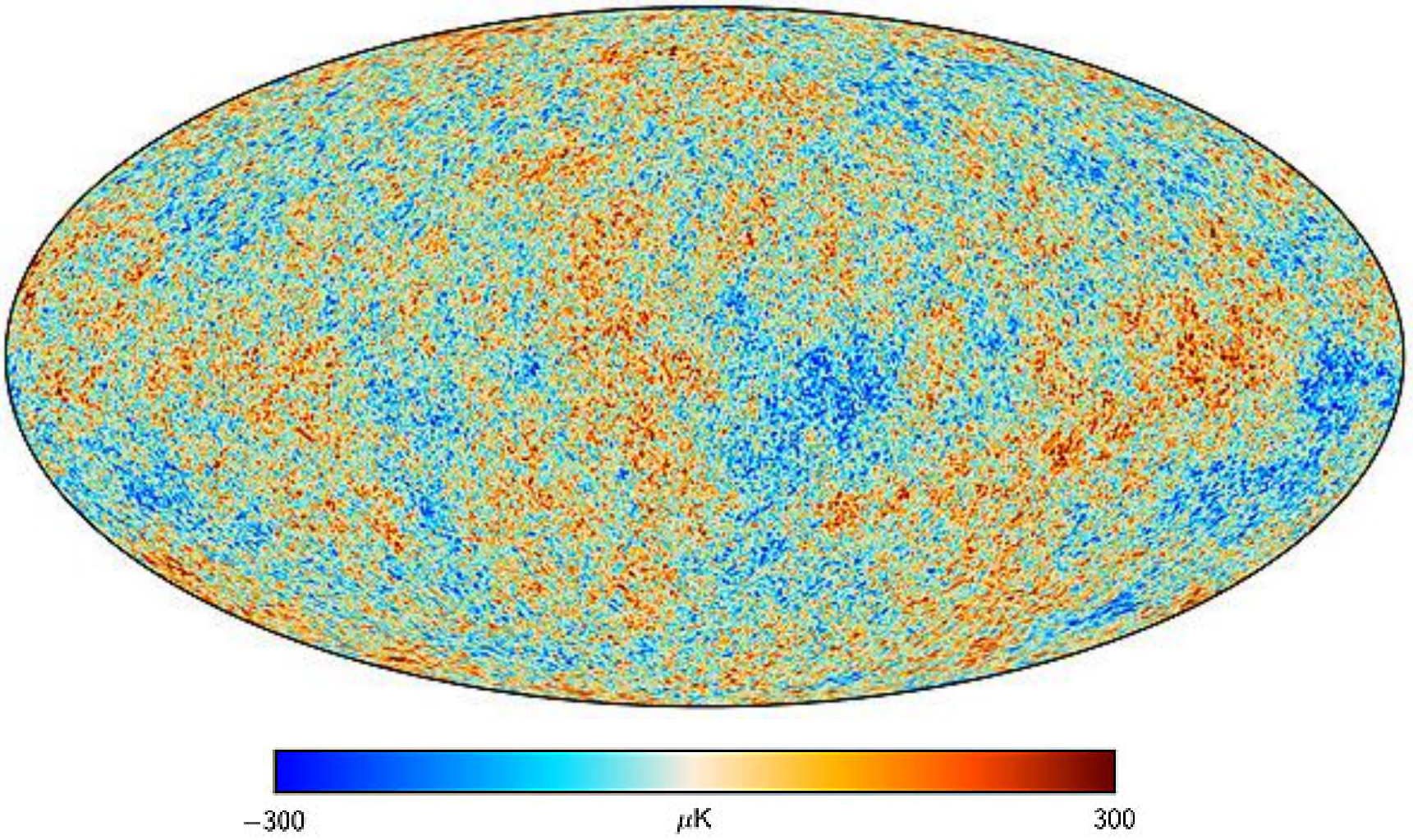
National Science Foundation (NASA, JPL, Keck Foundation, Moore Foundation, related)—Funded BICEP2 Program; modifications by E. Siegel

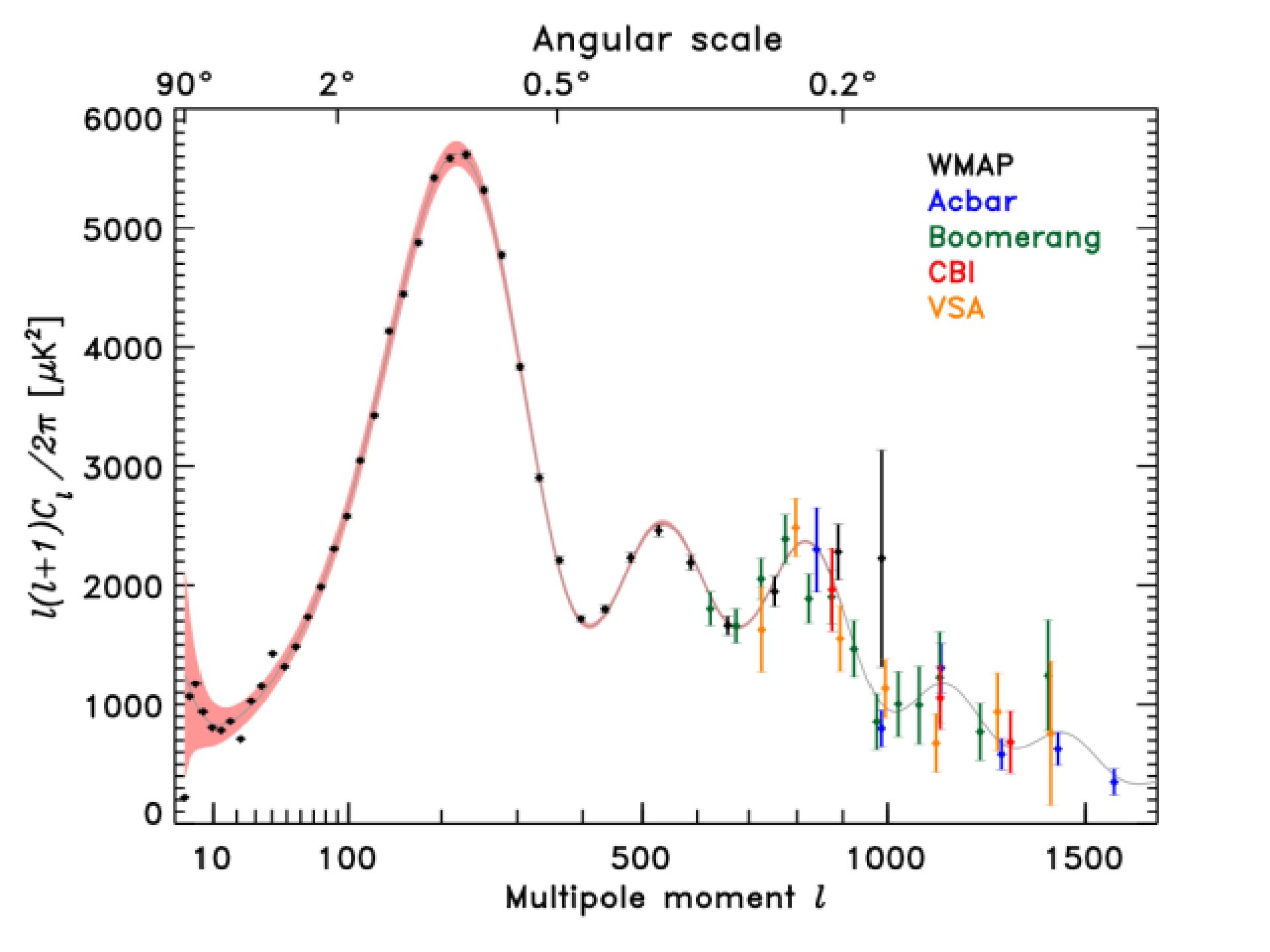


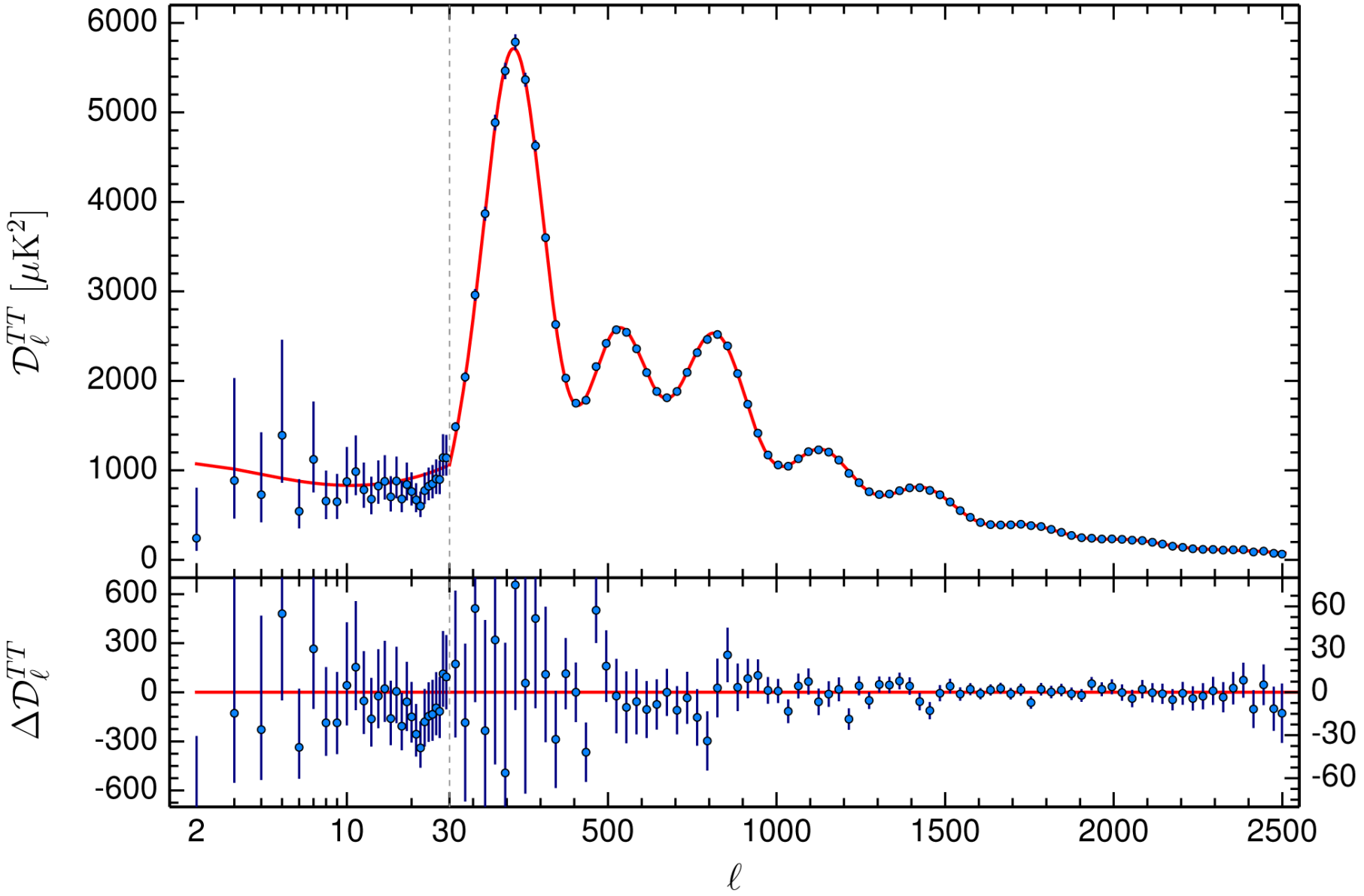
http://blogs.scientificamerican.com/guest-blog/files/2012/03/1000px-Wiens_law.jpg


Cosmic Microwave Background Spectrum from COBE
COBE Data
Black Body Spectrum
Intensity [MJy/sr]
Frequency [1/cm]
0
50
100
150
200
250
300
350
400
2
4
6
8
10
12
14
16
18
20
22

Planck temperature of CMB




Angular scale
90°
2°
0.5°
0.2°
WMAP
Acbar
Boomerang
CBI
VSA
$l(l+1)C_l/2\pi$ [μK^2]
6000
5000
4000
3000
2000
1000
0
10
100
500
1000
1500
Multipole moment l

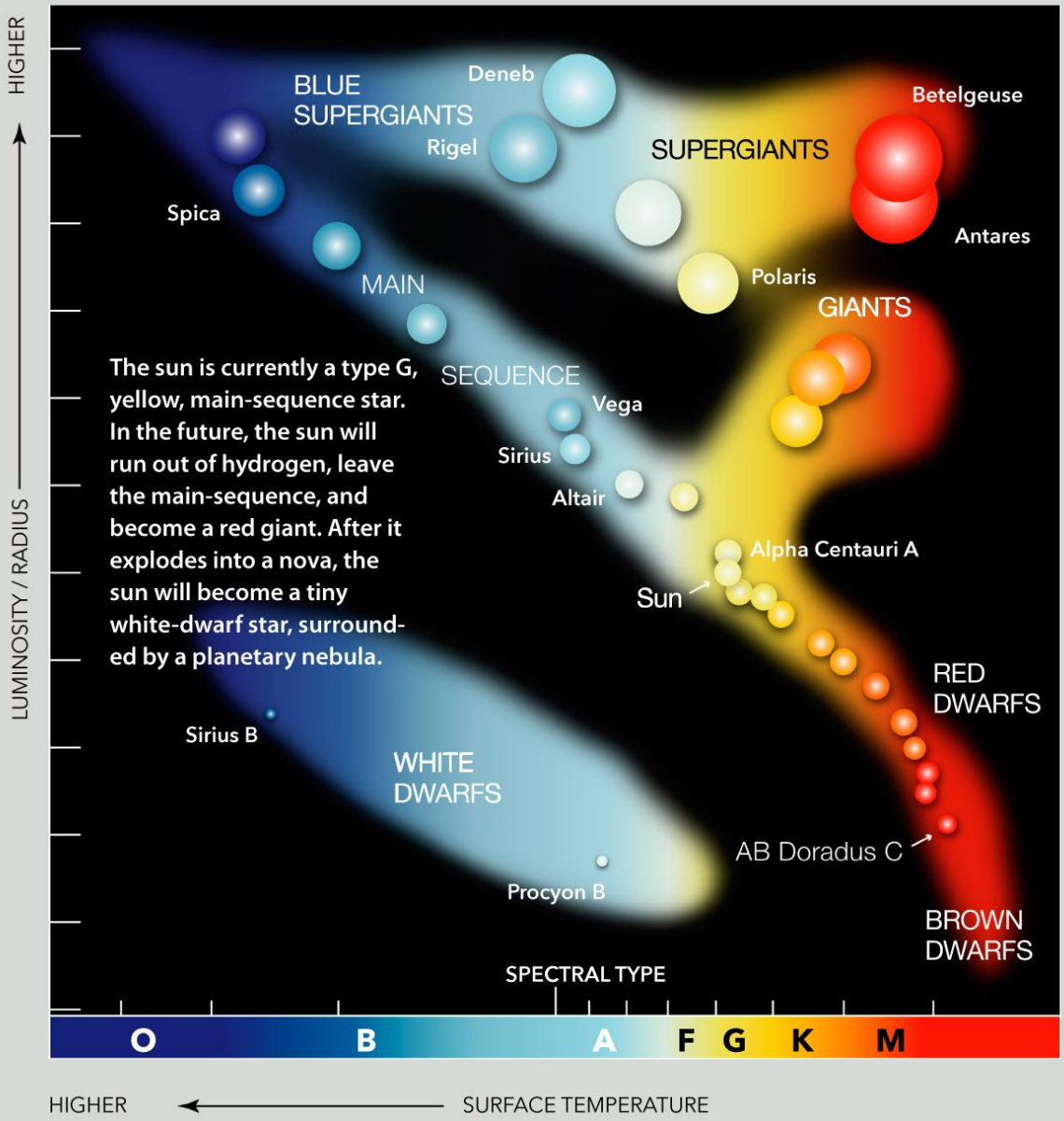

6000
5000
4000
3000
2000
1000
0
$\mathcal{D}_\ell^{TT}$ [μK^2]
600
300
0
-300
-600
$\Delta\mathcal{D}_\ell^{TT}$
60
30
0
-30
-60
2
10
30
500
1000
1500
2000
2500
ℓ

Inflationary Cosmology Scorecard

Prediction	Observation
The Universe should be perfectly flat.	**Flat to within 0.4%**
There should be an *almost* scale-invariant spectrum of fluctuations.	**Scale invariance parameter measured to be 0.968 ± 0.006**
There should be fluctuations on scales larger than light could have traveled since the Big Bang.	**Increasingly precise measurements of fluctuations measured since 1980s**
Quantum fluctuations, which translate into density fluctuations, should be adiabatic.	**Confirmed to be 100% adiabatic (and 0% isocurvature)**
There should be an upper limit, smaller than the Planck scale, to the temperature of the Universe in the distant past.	**Maximum temperature is limited to 0.1% of the Planck limit.**
And finally, there should be a set of primordial gravitational waves, with a particular spectrum.	**Not yet confirmed. Measurements to be made in the next decades.**

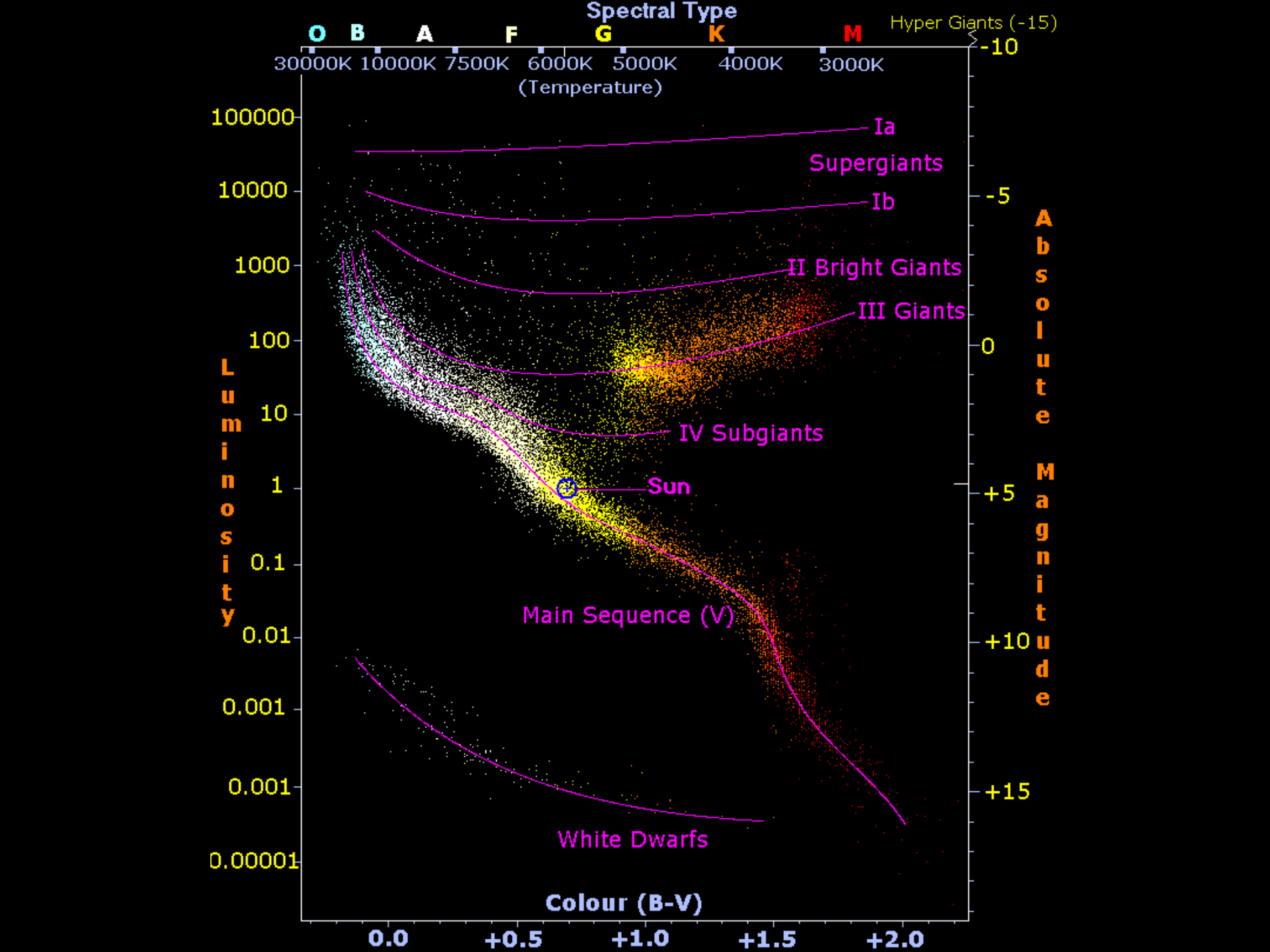
Ethan Siegel, Forbes, "What if cosmic inflation is wrong?"

HERTZSPRUNG-RUSSELL DIAGRAM

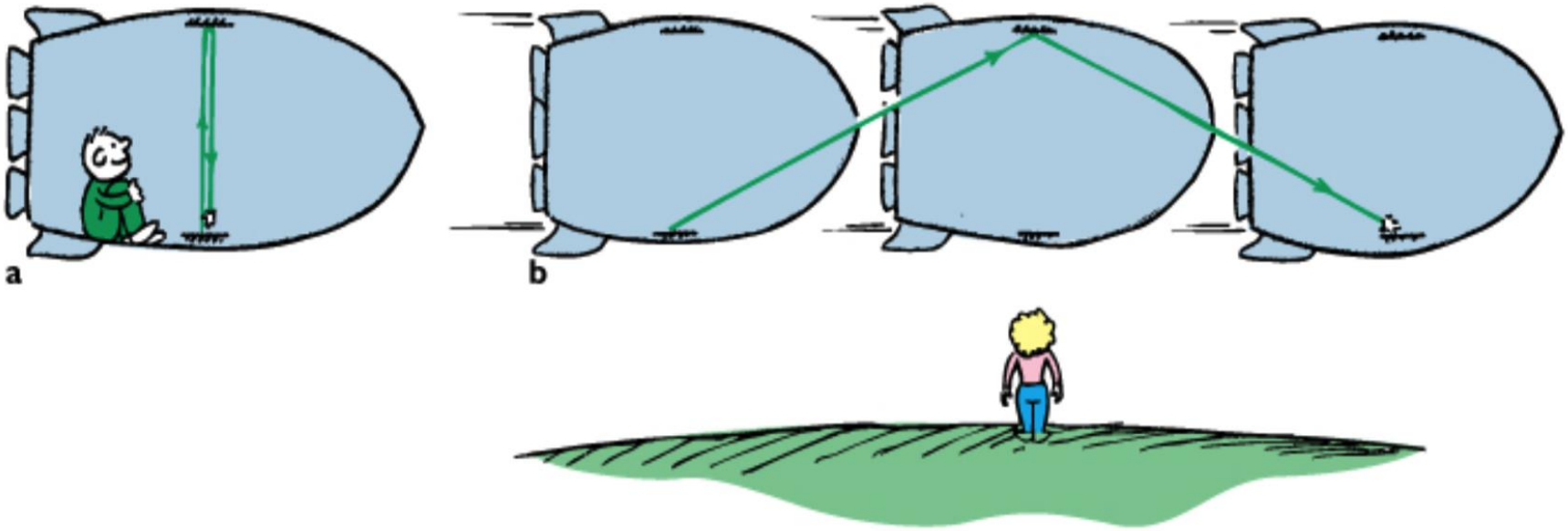


SOURCES: NASA, EUROPEAN SOUTHERN OBSERVATORY

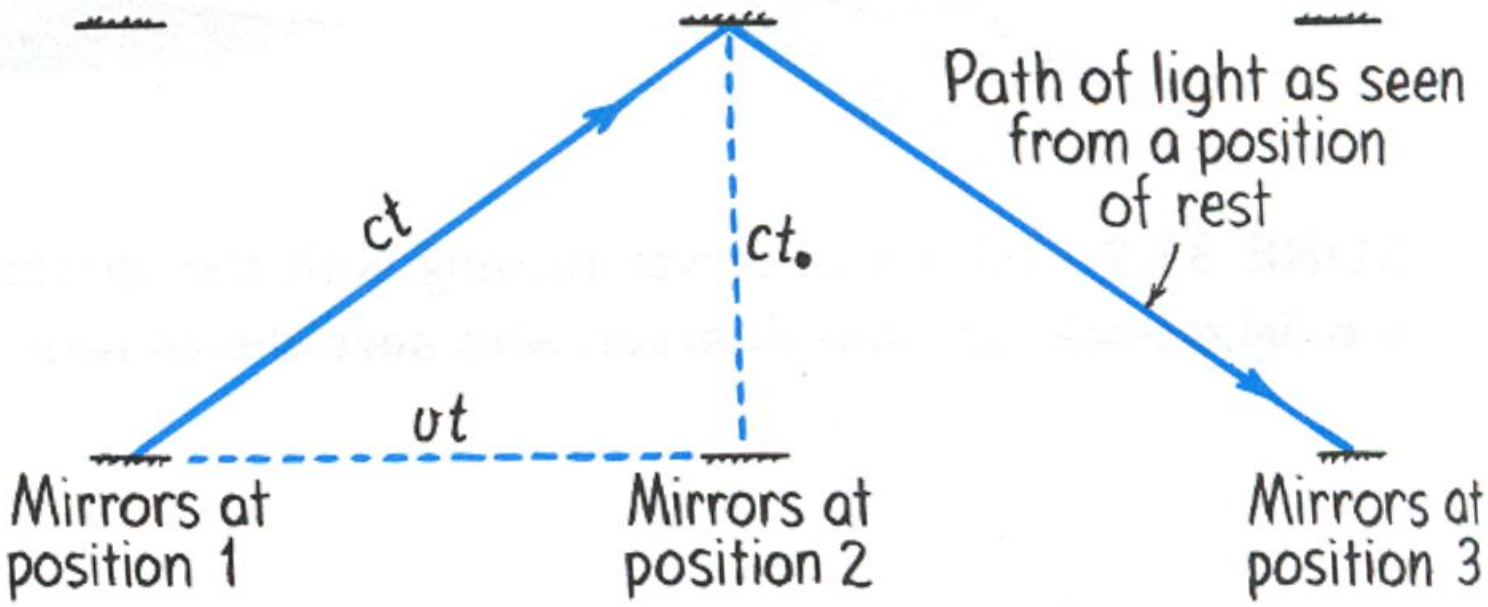
KARL TATE / © Space.com


Spectral Type
O B A F G K M
Hyper Giants (-15)
30000K 10000K 7500K 6000K 5000K 4000K 3000K
(Temperature)
-10
-5
0
+5
+10
+15
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.001
0.00001
Luminosity
Absolute Magnitude
Ia
Supergiants
Ib
II Bright Giants
III Giants
IV Subgiants
Sun
Main Sequence (V)
White Dwarfs
Colour (B-V)
0.0
+0.5
+1.0
+1.5
+2.0

Relative Time



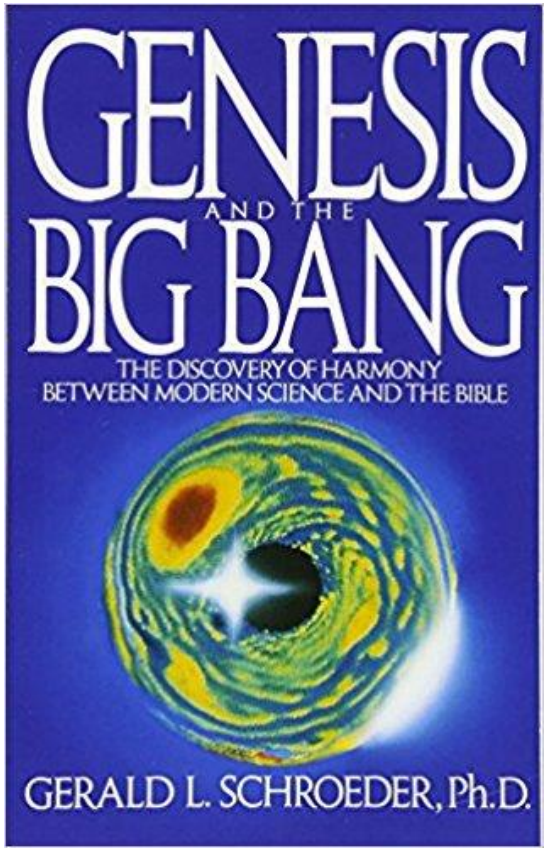
Relative Time



Conclusion: *Two observers will disagree on the time a trip will take. Moving clocks run slower.*

Genesis and the Big Bang: The Discovery Of Harmony Between Modern Science And The Bible

Dr. Gerald Schroeder



"Today, we look back in time. We see 15 billion years. Looking forward from when the universe is very small — billions of times smaller — the Torah says six days. They both may be correct."

http://www.aish.com/ci/sam/48951136.html