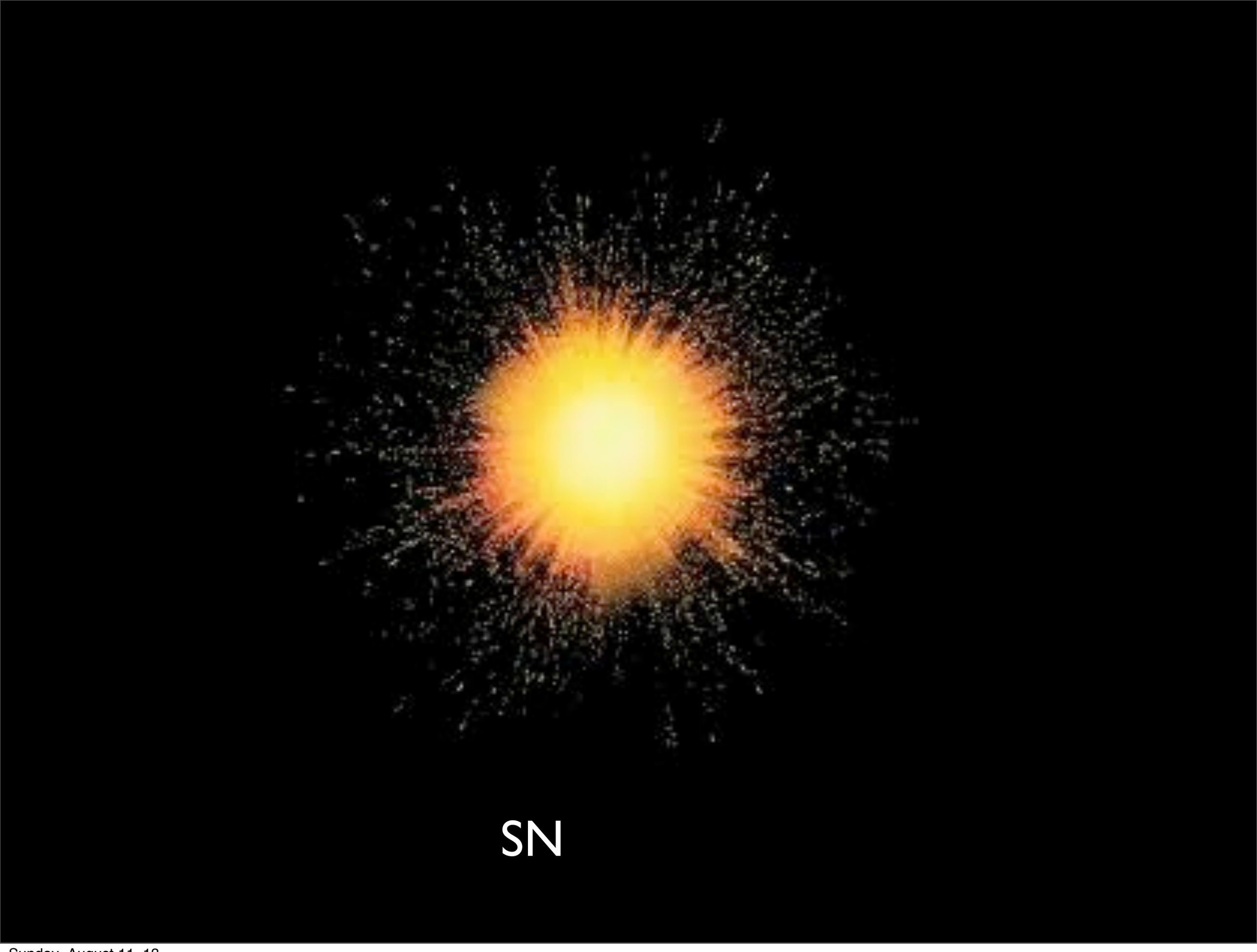
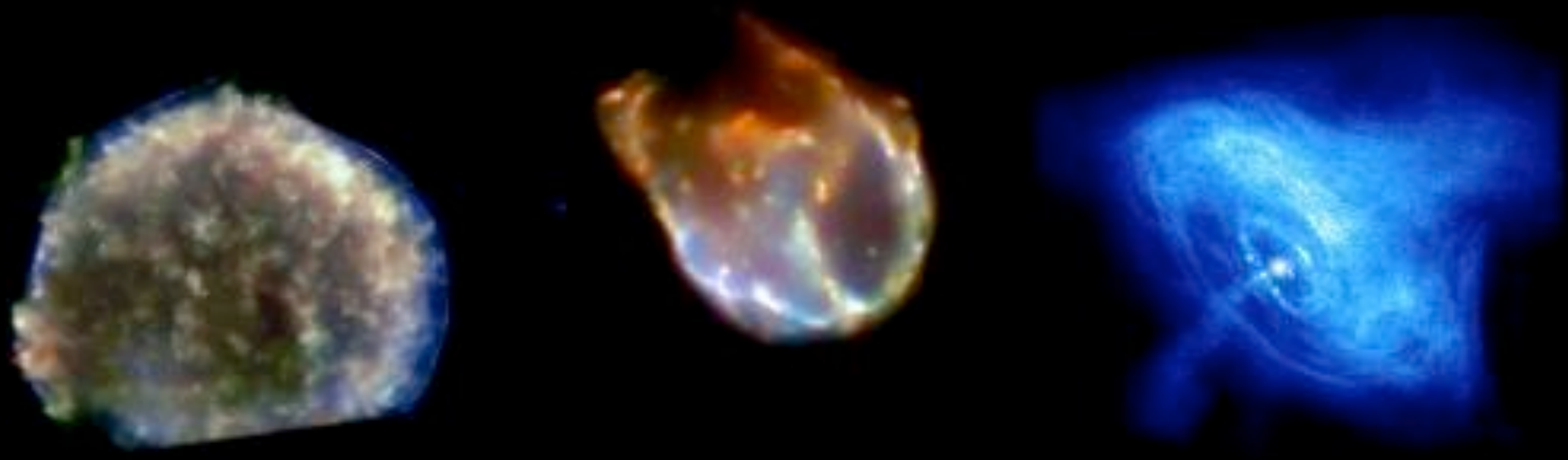
Surm kosmoses

Enn Saar, Tartu Observatoorium

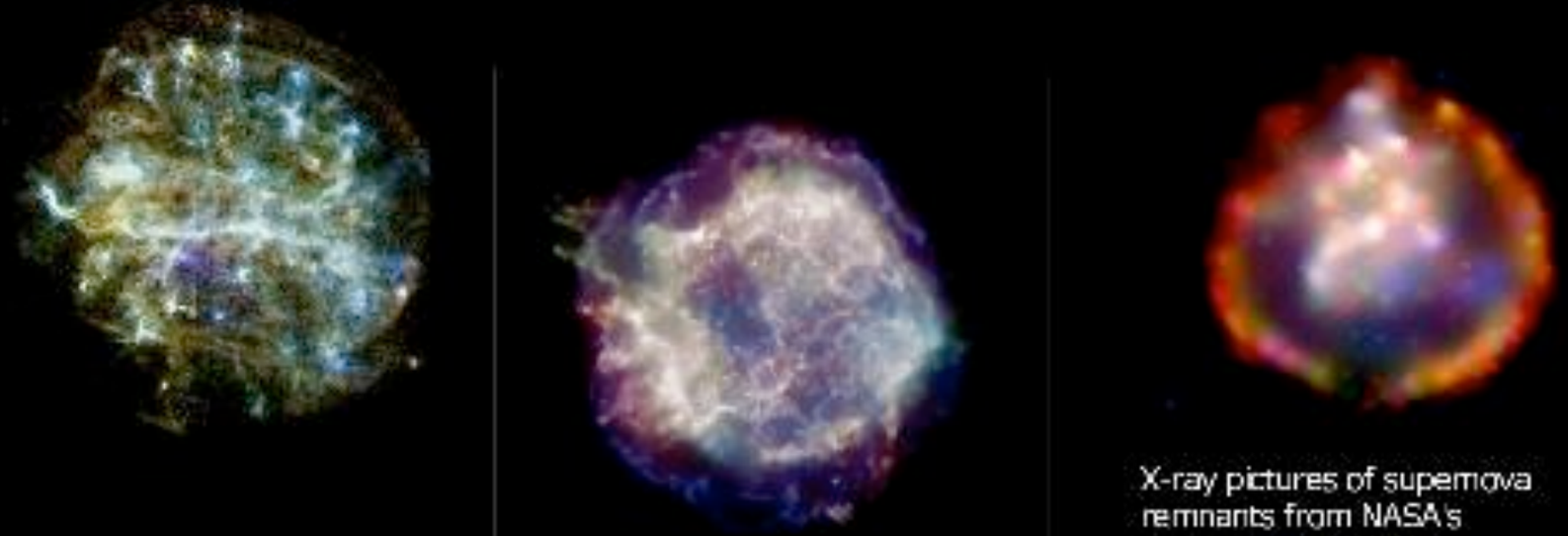
Viitna, 11.08.2013


© Xiaolong 2007

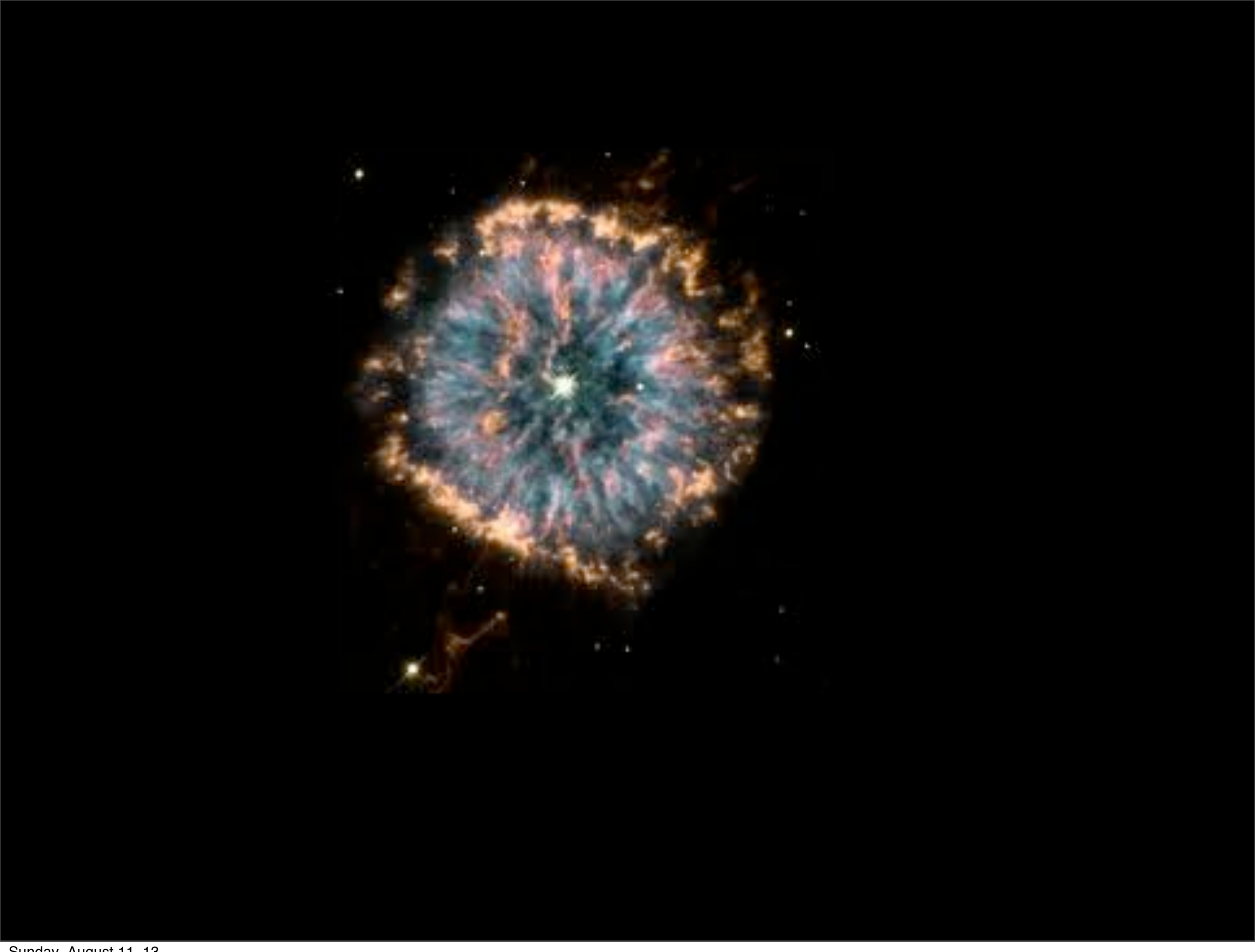

SN



Massive stars explode

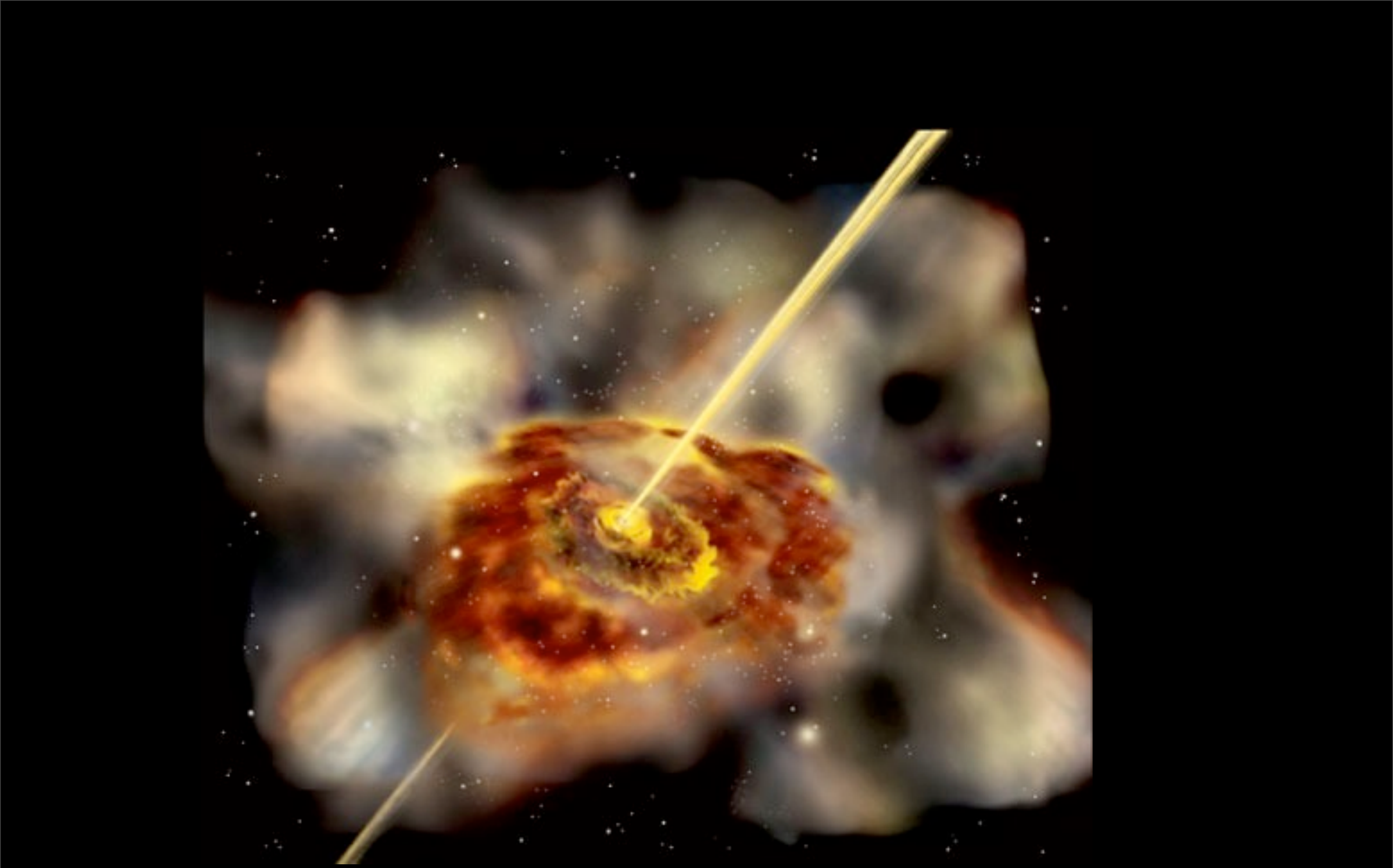


X-ray pictures of supernova remnants from NASA's Chandra Observatory http://chandra.harvard.edu/

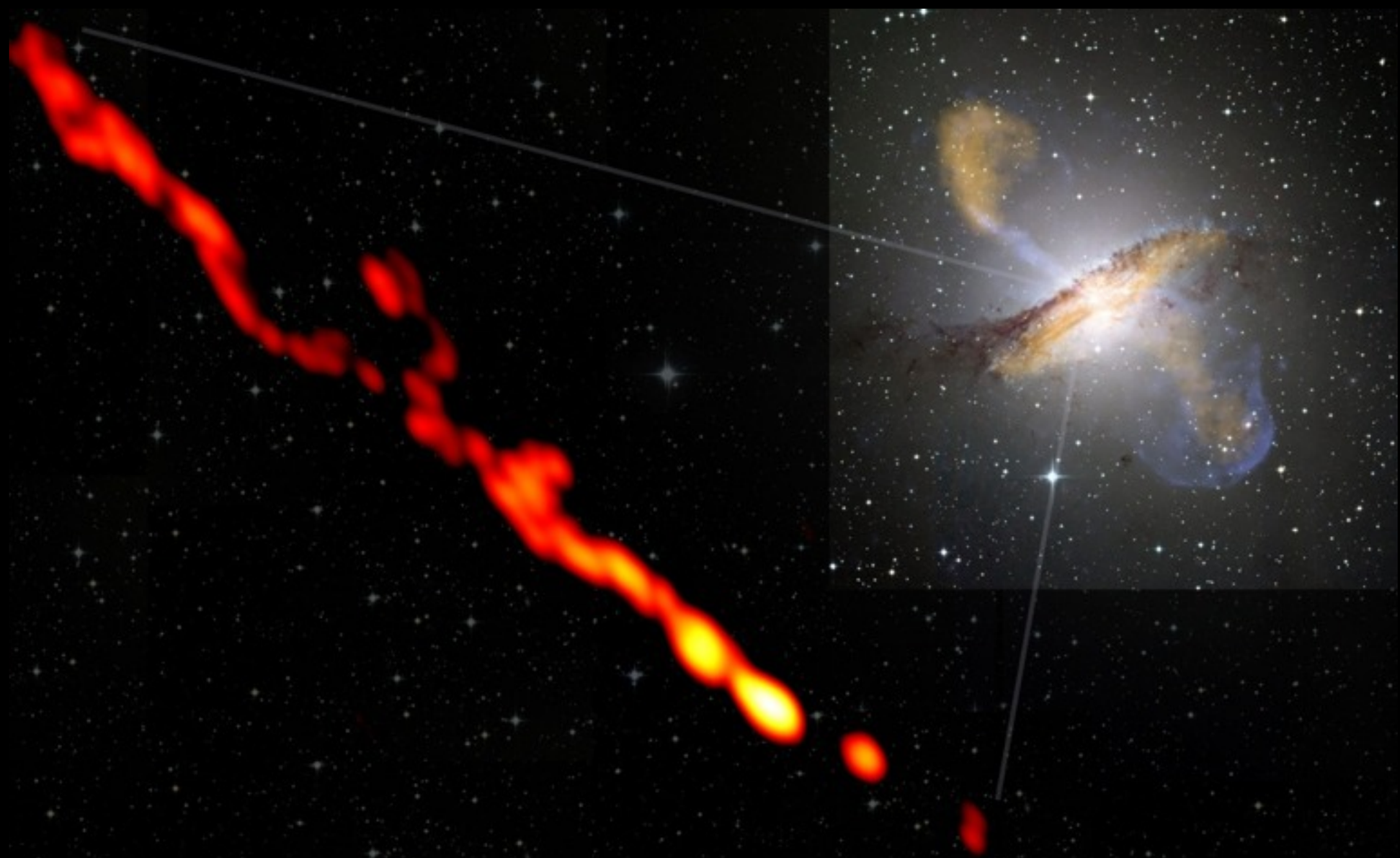


GRB

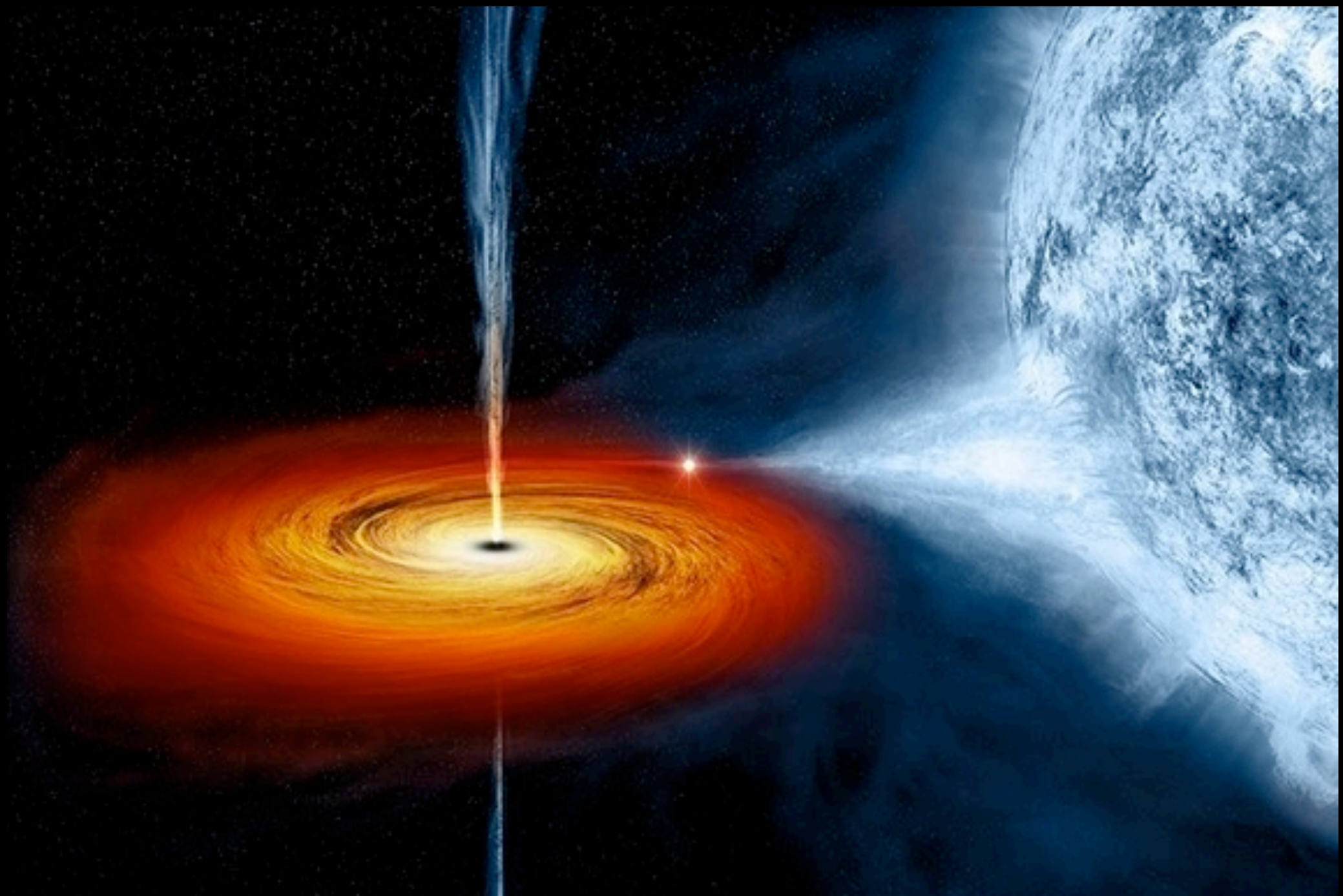

© NASA/Dana Berry/SkyWorks Digital



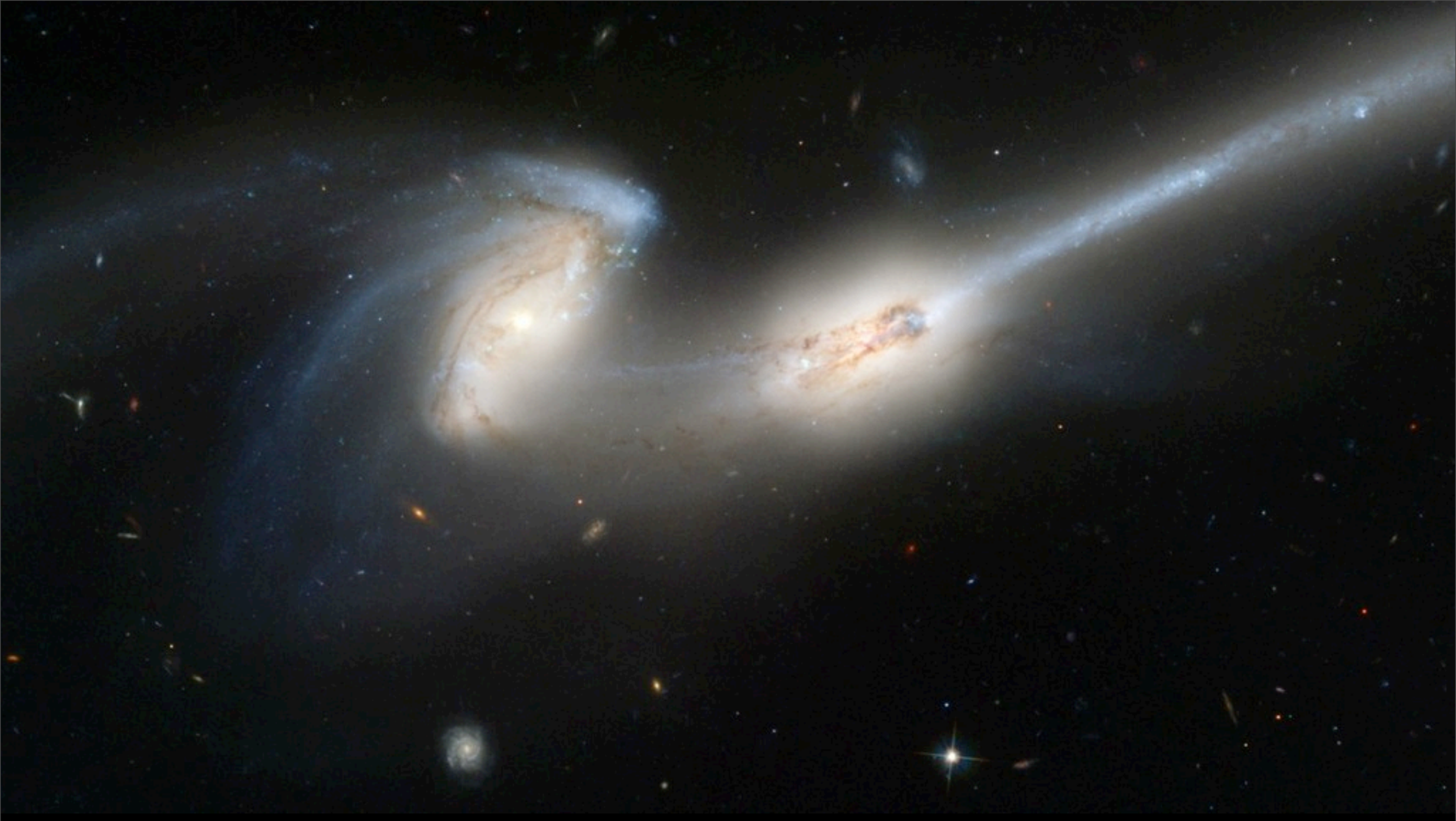
AGN

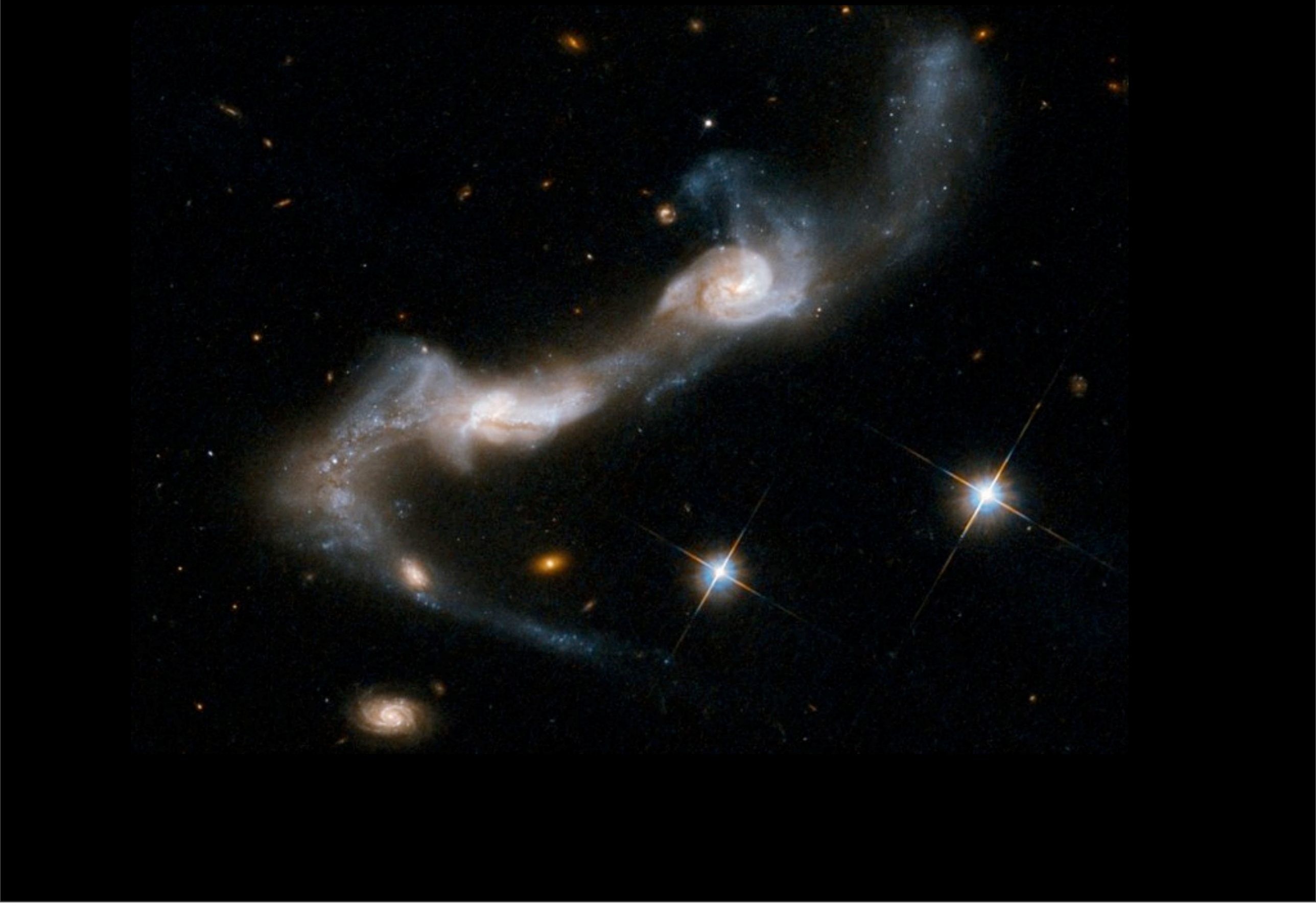


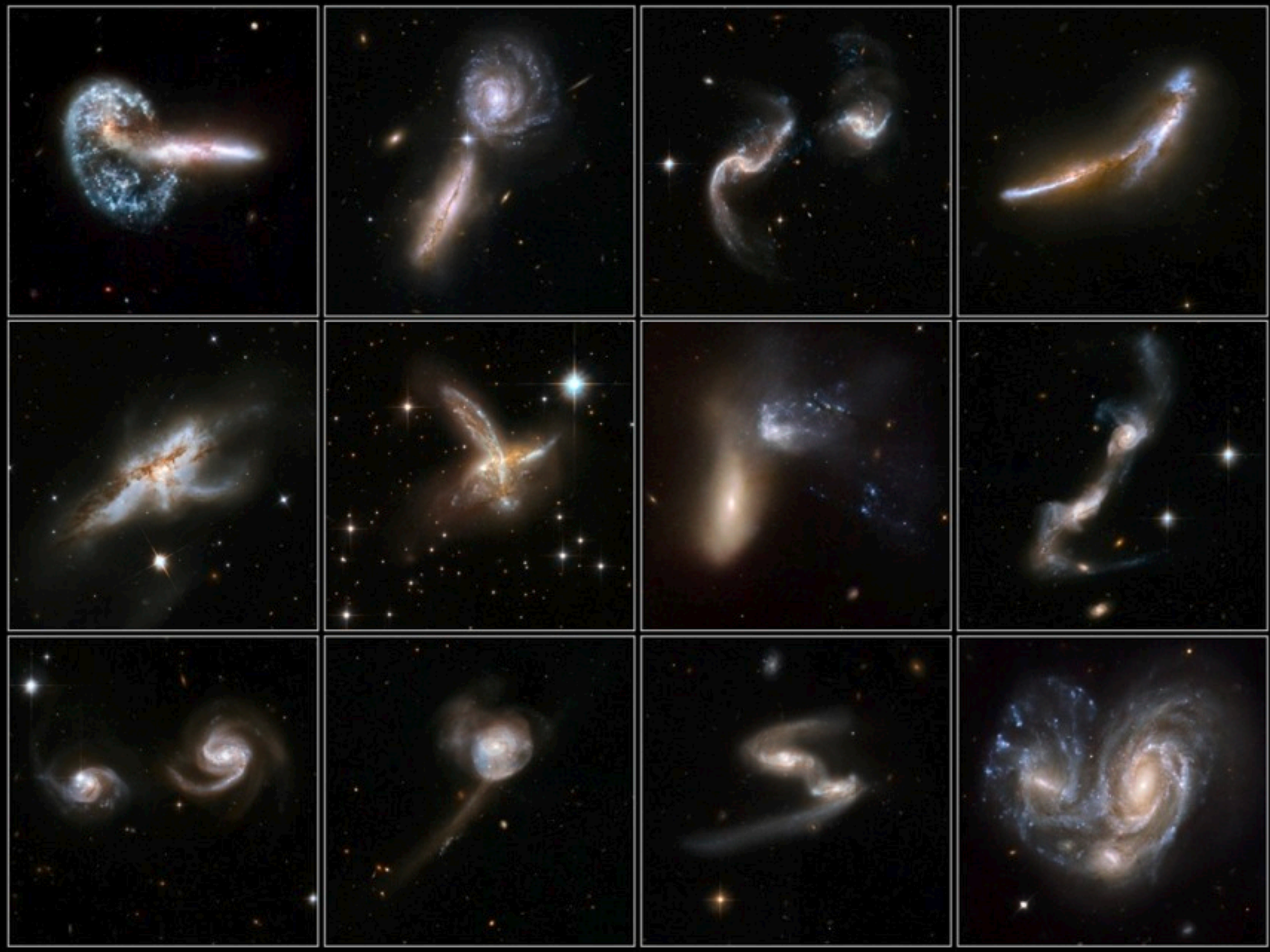
Centaurus-A

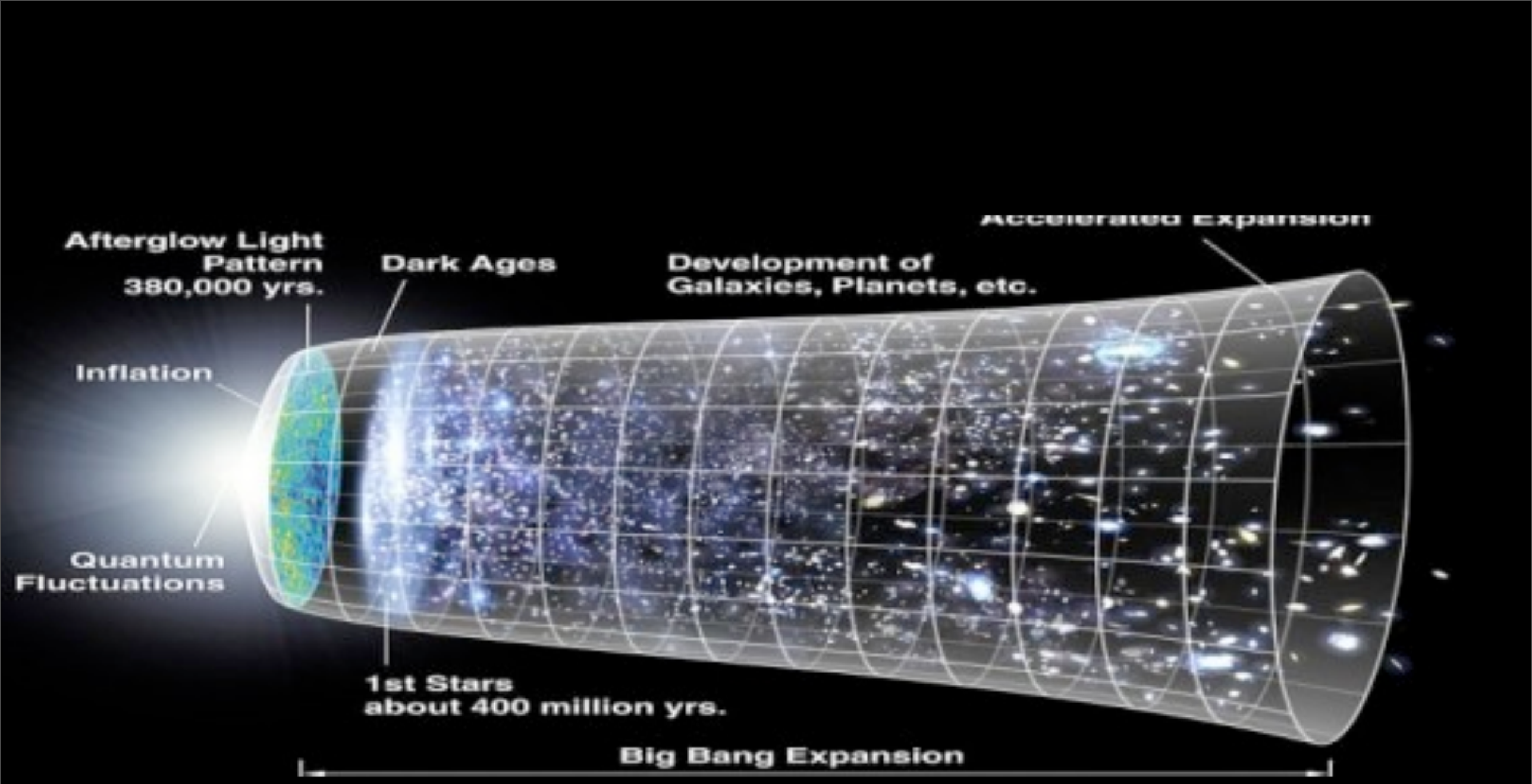


Cygnus-X

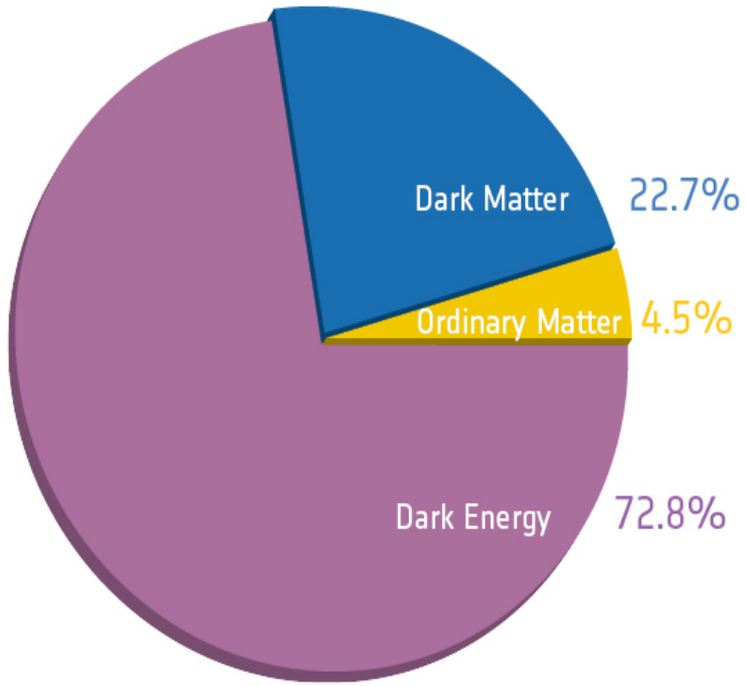


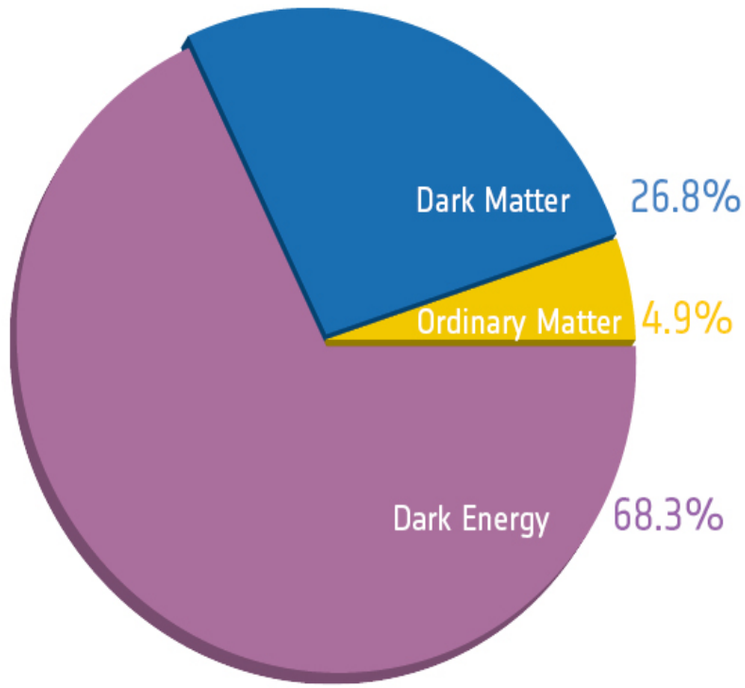





Afterglow Light
Pattern
380,000 yrs.
Dark Ages
Development of
Galaxies, Planets, etc.
Accelerated Expansion
Inflation
Quantum
Fluctuations
1st Stars
about 400 million yrs.
Big Bang Expansion

The basic content of the Universe



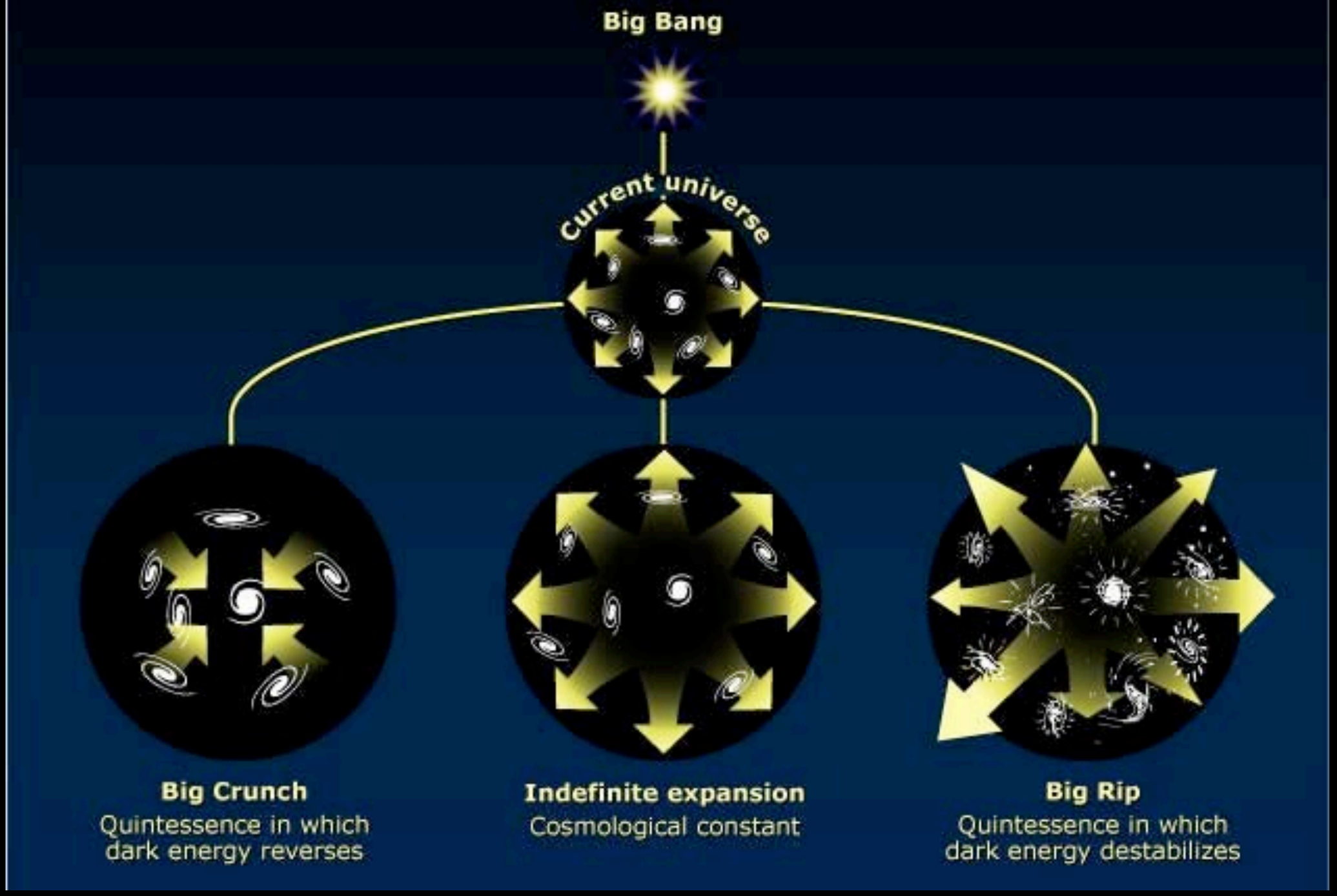


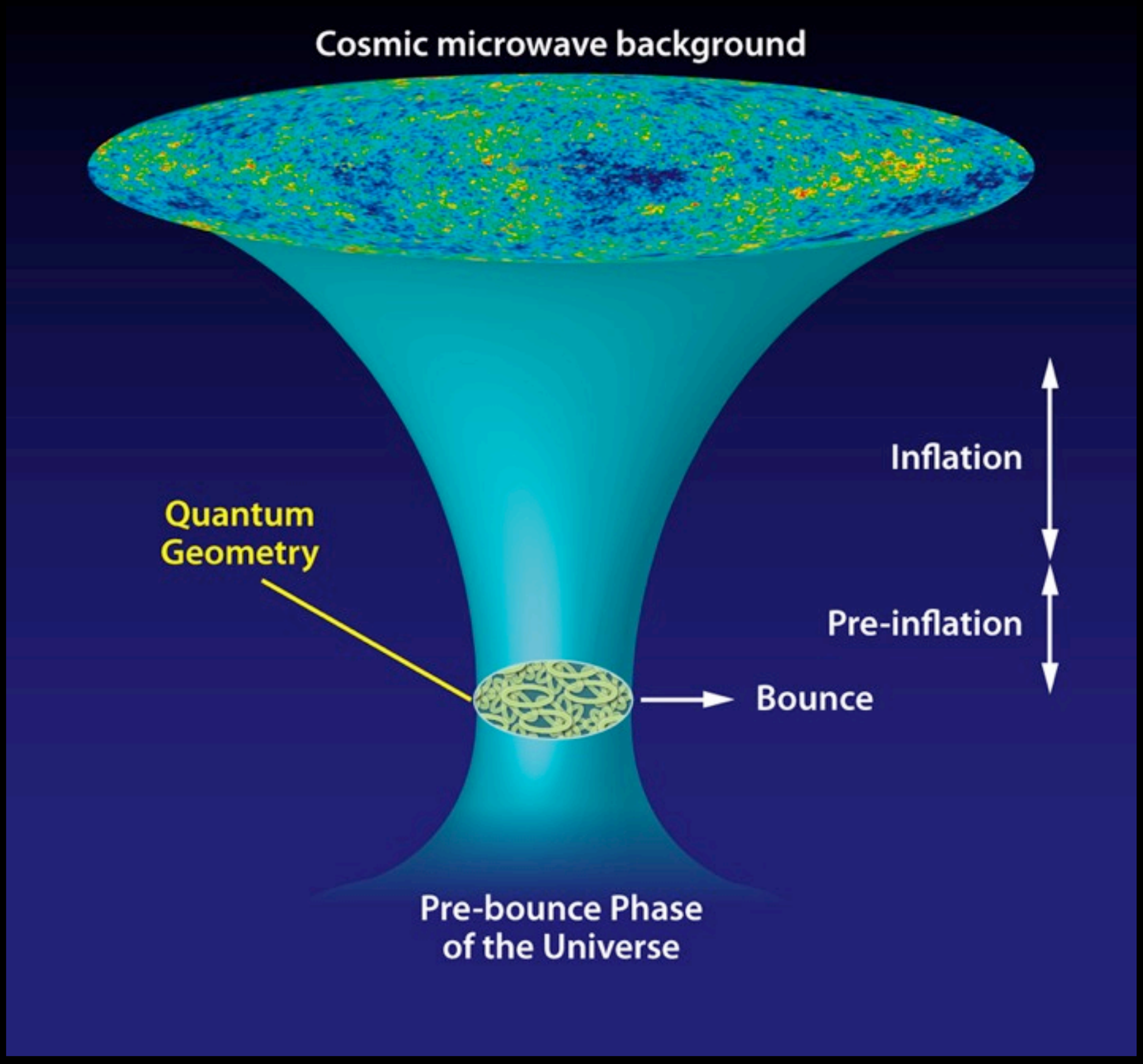
Before Planck

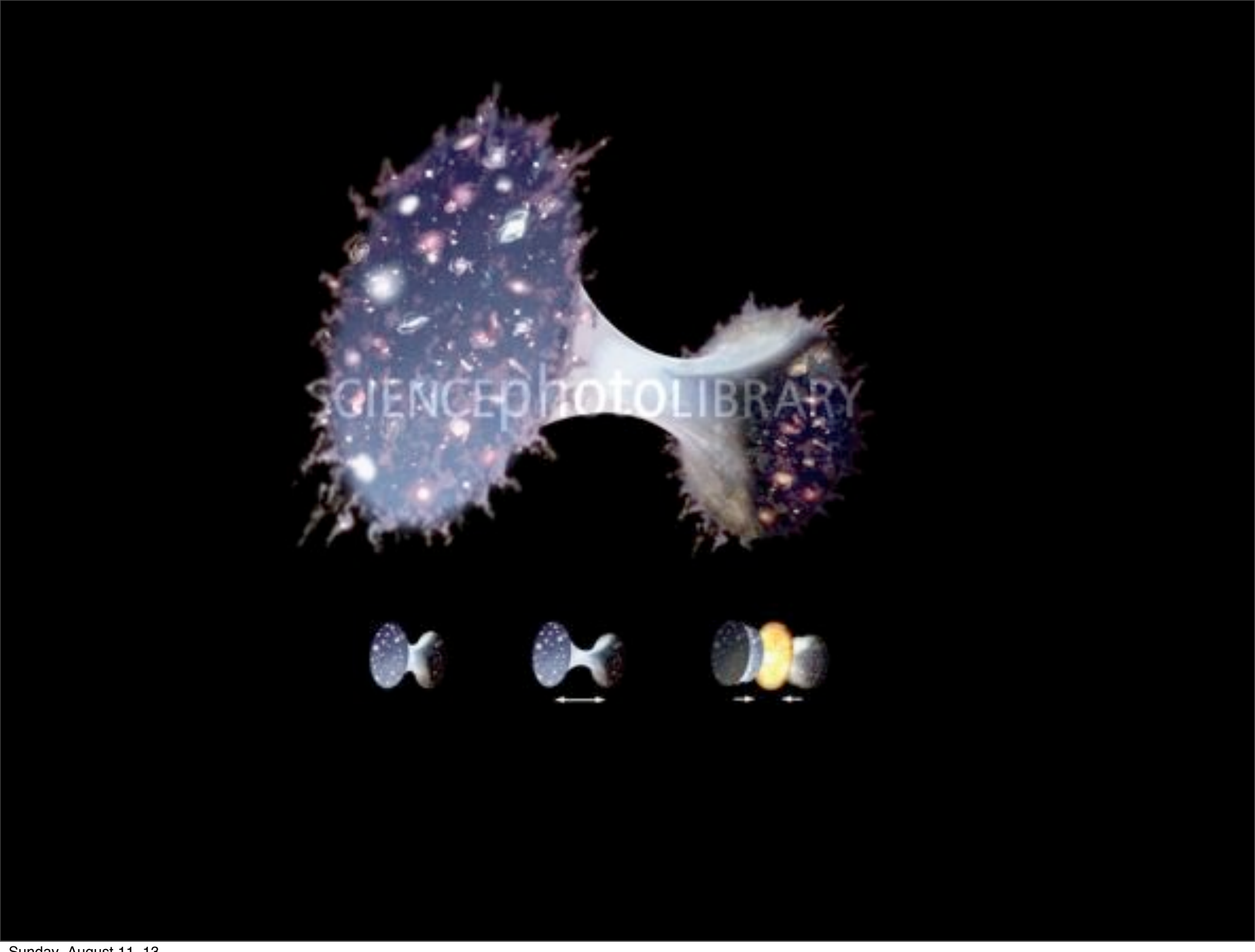
After Planck

...has changed!

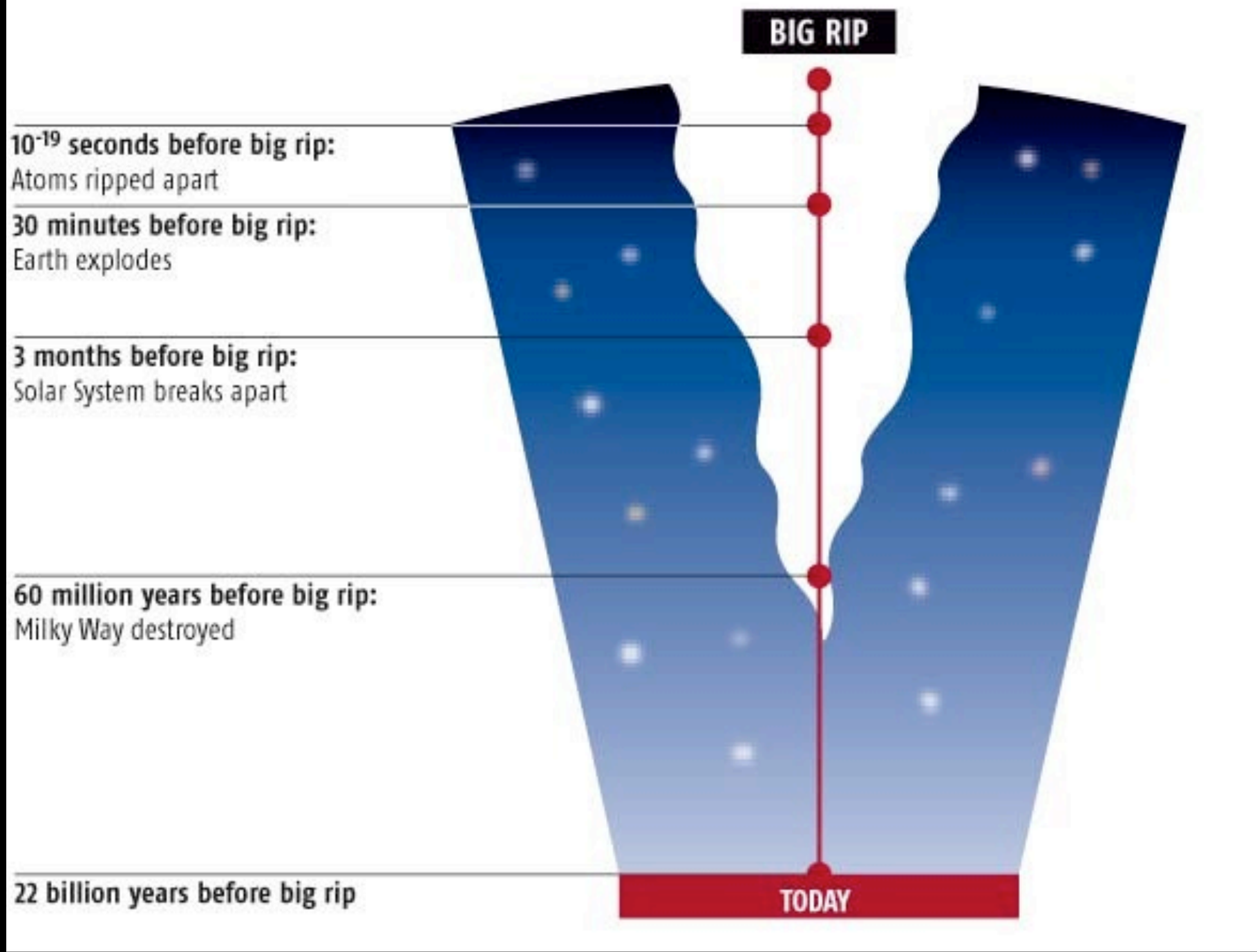
Future fates of the dark-energy universe

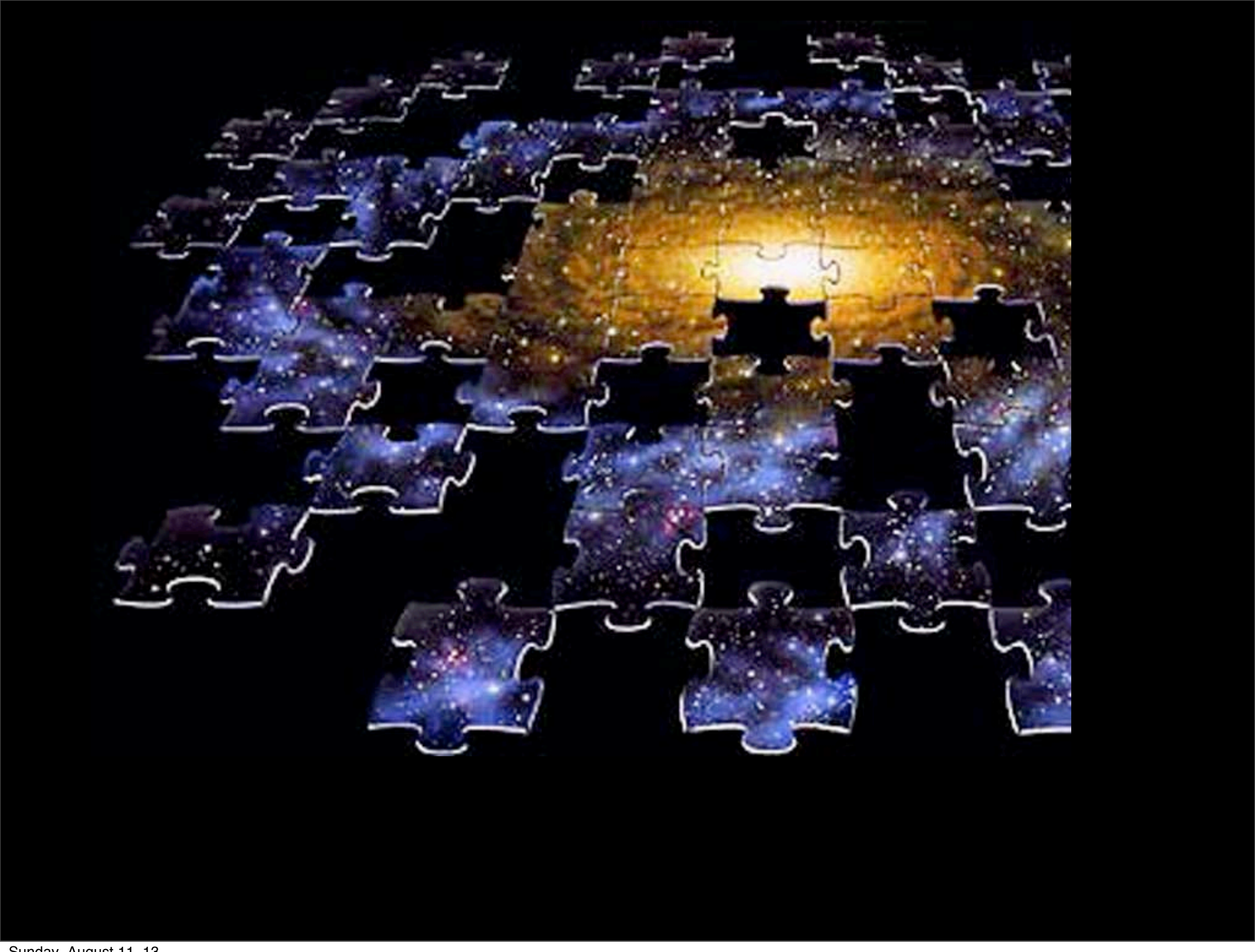


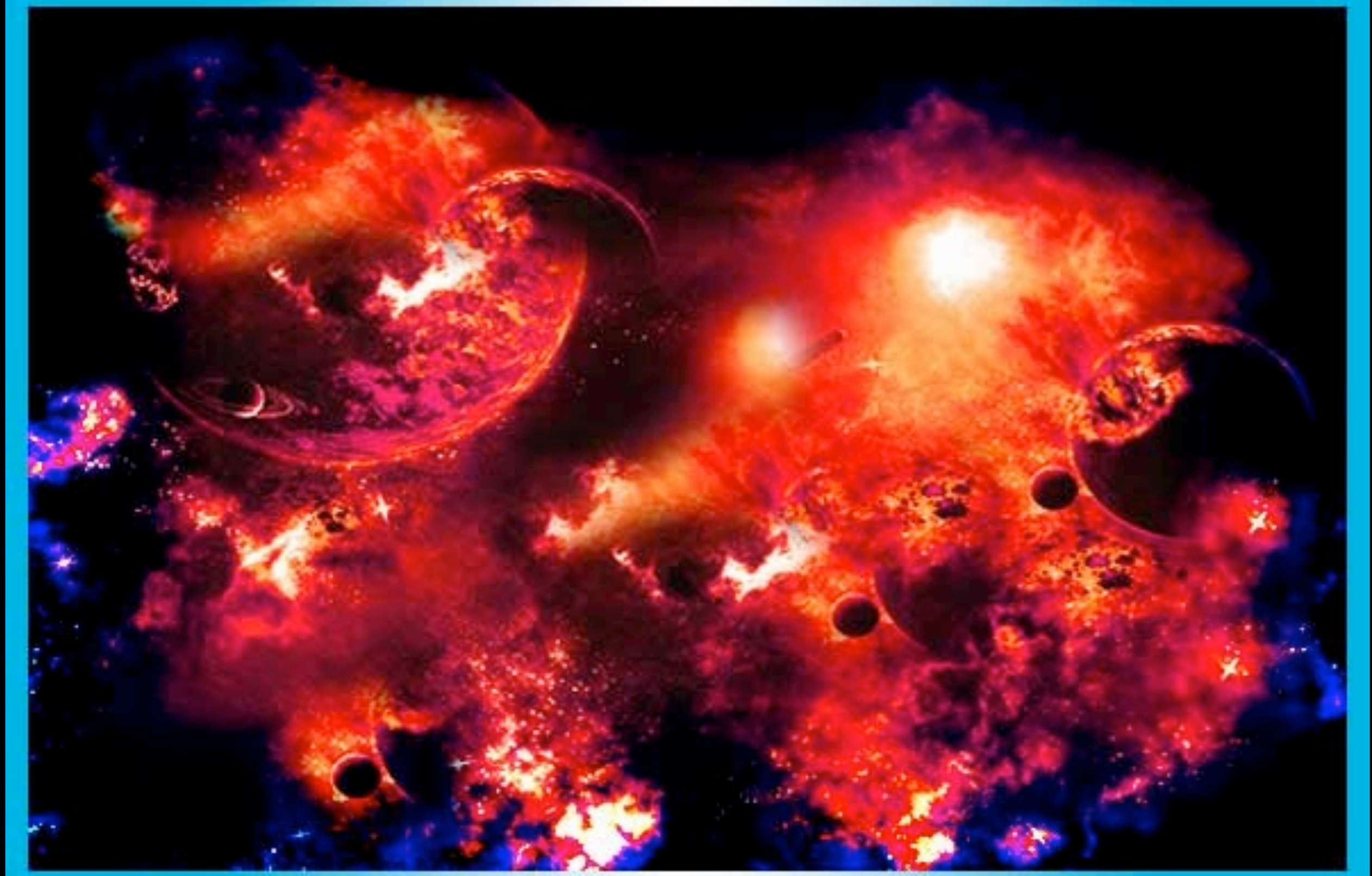

Cosmic microwave background
Inflation
Quantum
Geometry
Pre-inflation
Bounce
Pre-bounce Phase
of the Universe


SCIENCE photoLIBRARY

END OF EVERYTHING





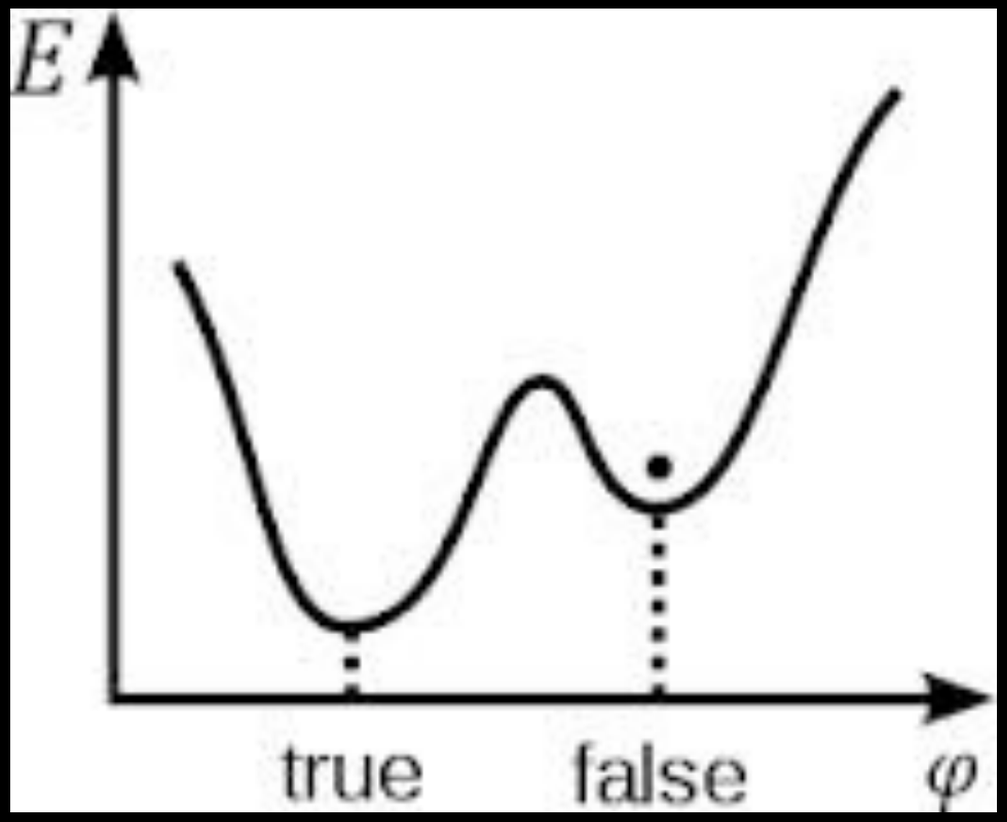


Big Rip

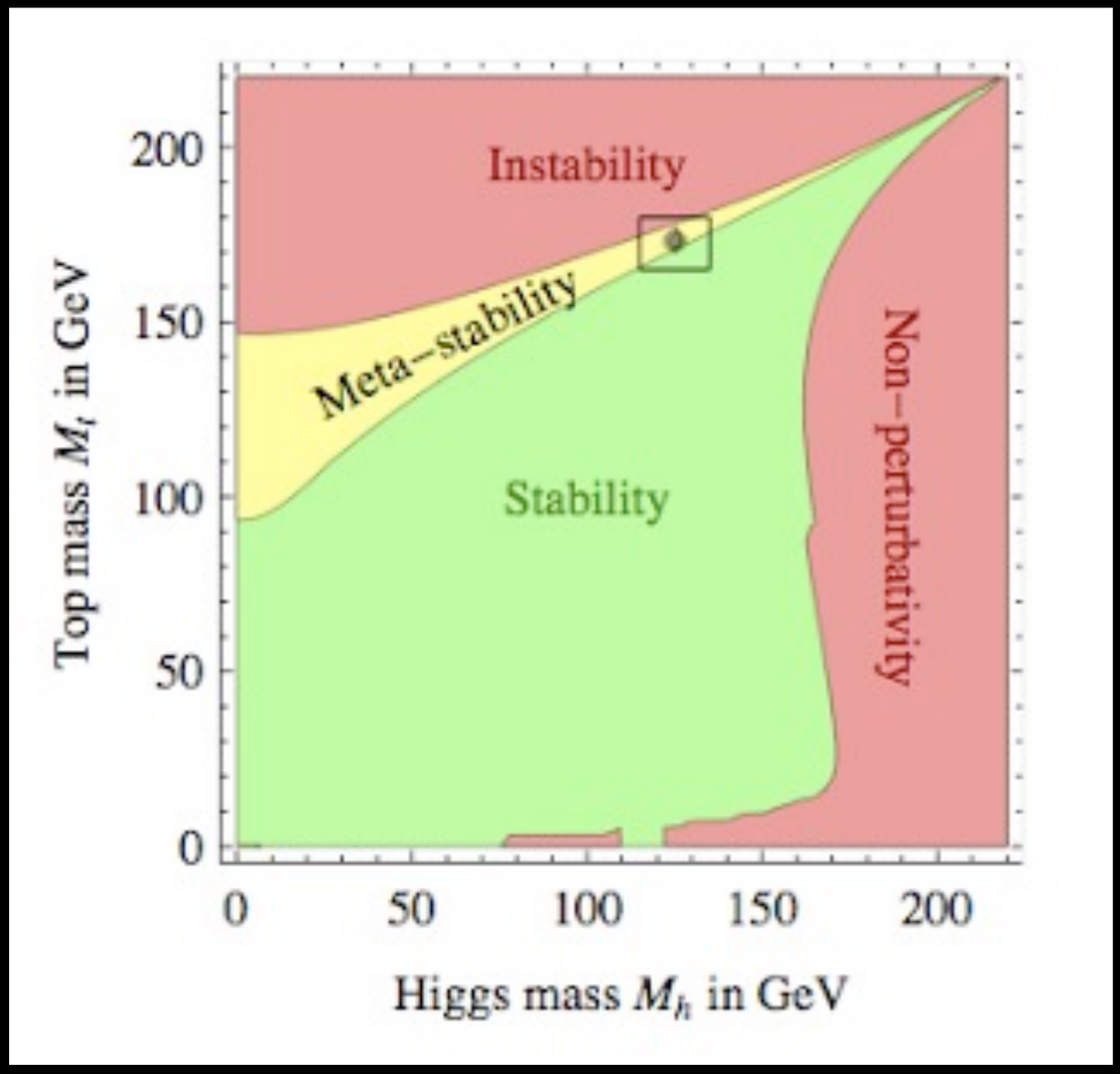
Külmumine -- energia saab otsa

Freeman J. Dyson, Time without end: Physics and biology in an open universe, Rev. Mod. Phys. 51, 1979

1. Tähtede iga - max 10^{14} aastat
2. Planeetide kadu - 10^{15} aastat
3. Tähtede kadu - 10^{19} aastat
4. Galaktika gravikiirguslik kollaps - 10^{24} aastat
5. Mustad augud kiirguseks - 10^{64} kuni 10^{100} aastat
6. Kivimite veeldumine - 10^{65} aastat
7. Aine rauaks - 10^{1500} aastat
8. Raudtähed neutrontähtedeks - $10^{10^{76}}$ aastat



vaakumi ebastabiilsus



Higgs'i surm


FISSURE

- planeedi surm
- tähesurm
  - kääbused
- neutrontähed
- supernoovad
- gammapaugud

- galaktikad
  - supersuured mustad augud, AGN
  - põrked
- universum
  - suur krõmps või põrge
  - suur lõhe
  - külmumine

- tapja aeg
- ebastabiilne vaakum
- Higgsi surm