

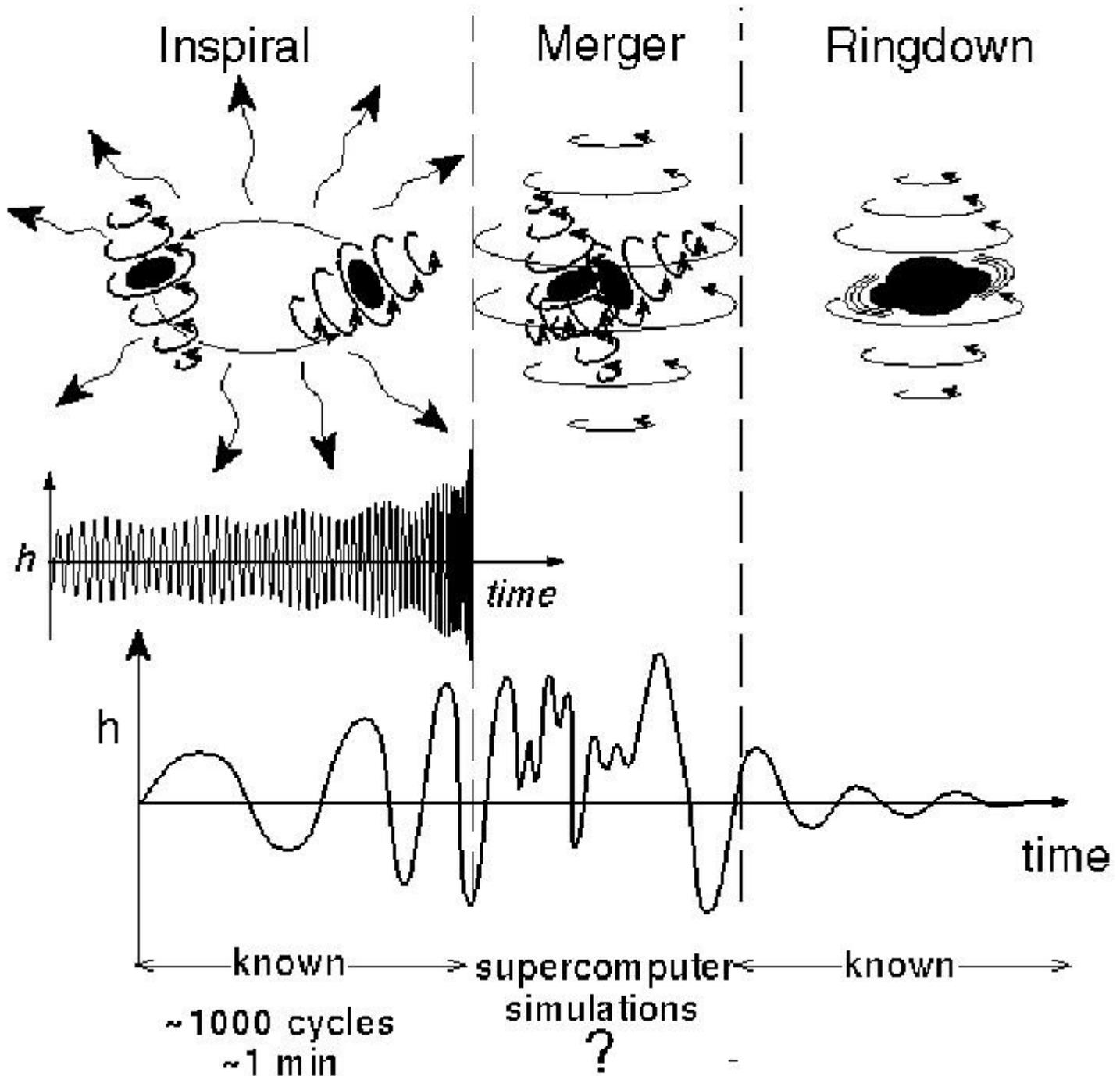
LIGO Science

Kip S. Thorne

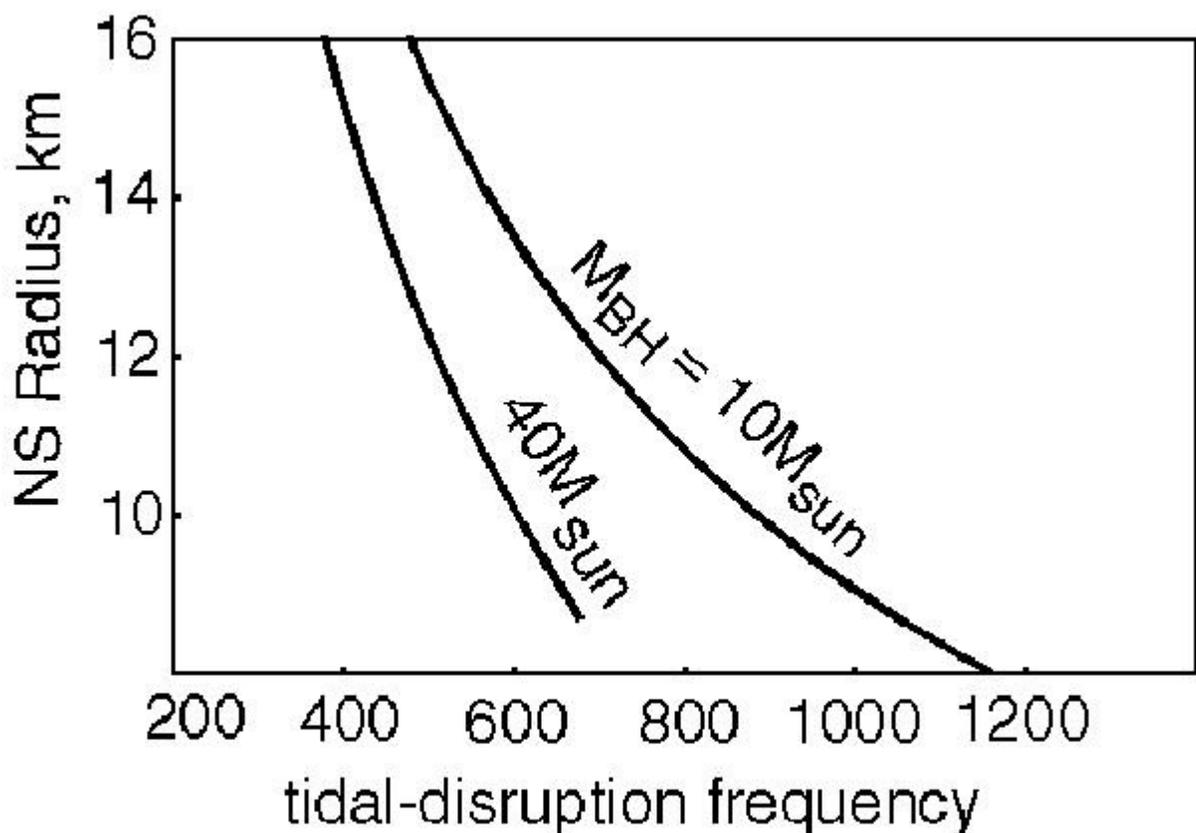
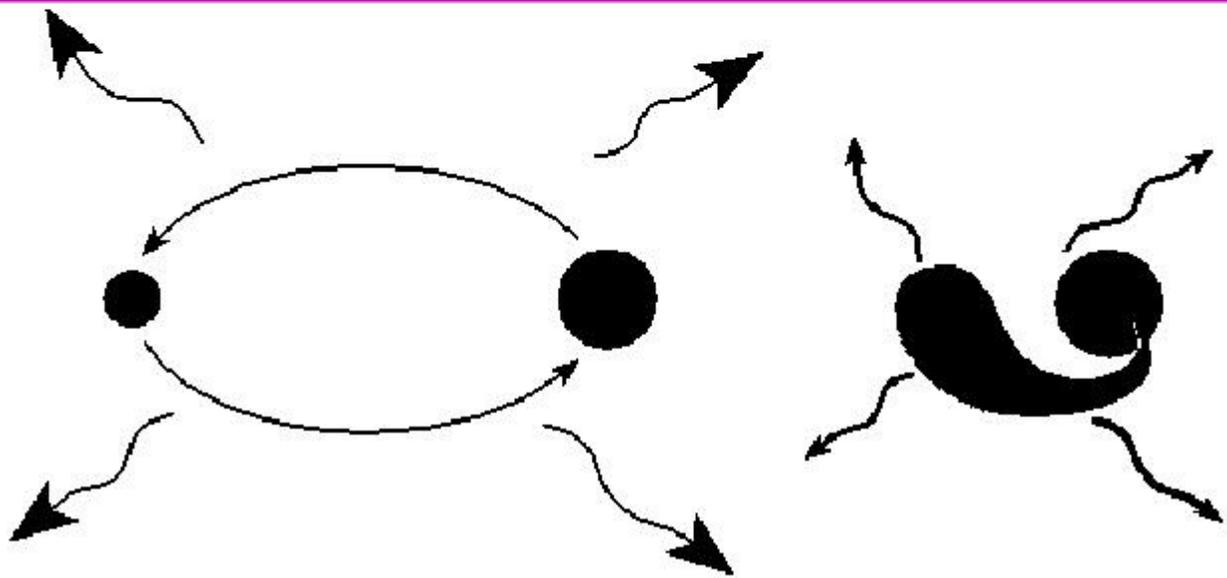
CaRT / LSC

California Institute of Technology

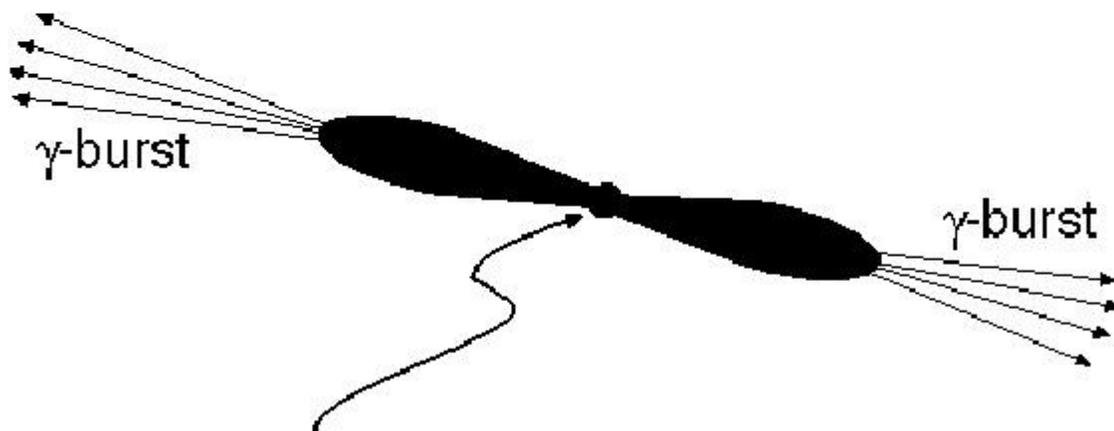
Gravitation Physics: Exploring Black Holes



Nuclear Physics: Tidal Disruption of Neutron Star by Black Hole

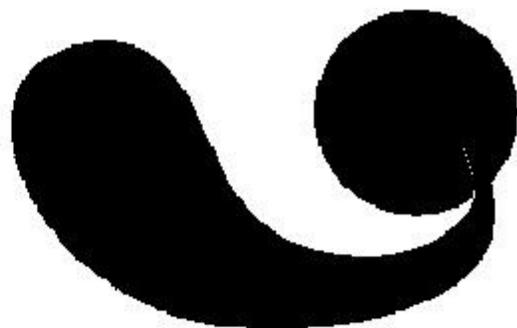


Astrophysics: The Power Source for Gamma-Ray Bursts

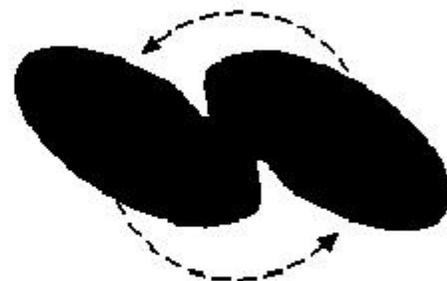


Power Source:

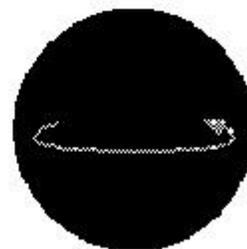
Neutron-star
tidal disruption
by black hole?



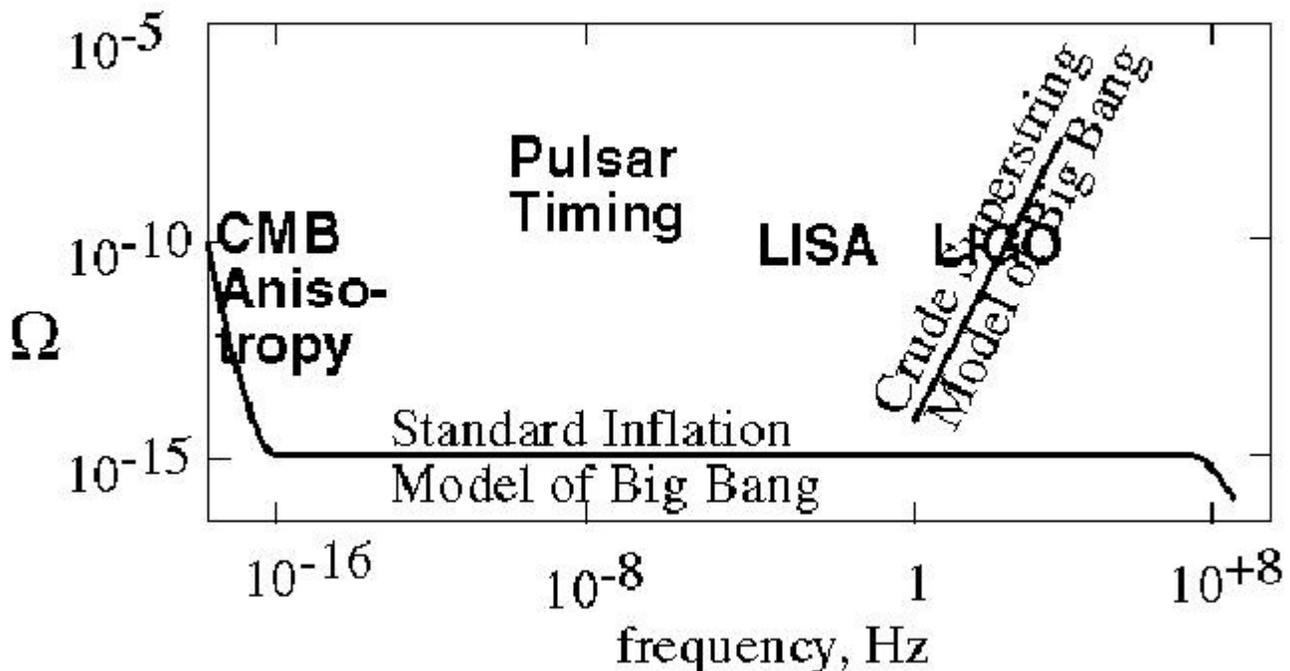
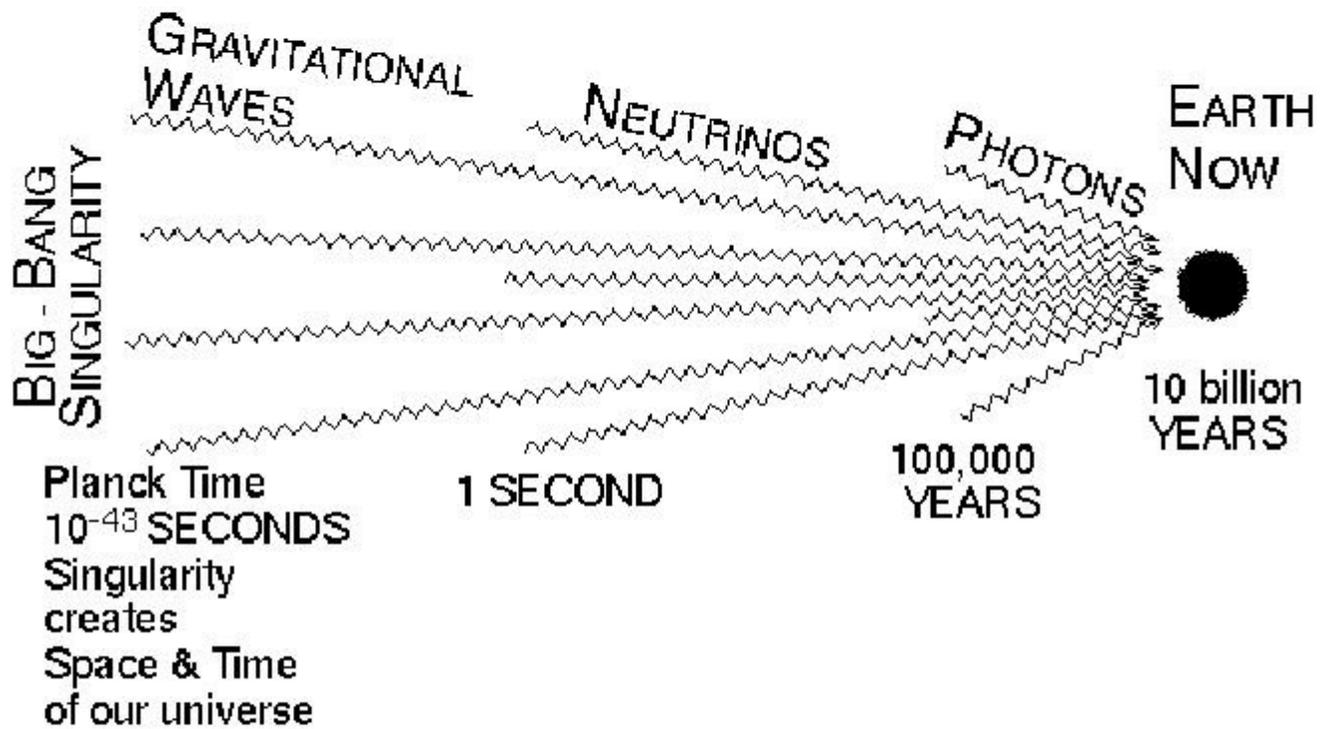
Neutron-star /
neutron-star
collision?



Collapse of star
to form spinning
black hole?



Cosmology: Exploring the Big-Bang Singularity



Exploring the Unknown

- **Electromagnetic Waves**

- » Oscillations of EM field propagating through spacetime
- » Incoherent superposition of waves from particles, atoms and molecules
- » Easily absorbed and scattered

- **Gravitational Waves**

- » Oscillations of the “fabric” of spacetime itself
- » Coherent emission by bulk motion of matter and energy
- » Never significantly absorbed or scattered

- **Implications:**

- » Surprises Likely
- » Revolution in our understanding of gravity and the universe?