Answer on Question #63920, Physics / Astronomy | Astrophysics

What is inside a black hole?

Where does the things goes which are sucked in black hole?

Solution:

The gravity of black hole is strong because matter has been squeezed into a tiny space. This can happen when a star is dying. After a black hole has formed, it can continue to grow by absorbing mass from its surroundings. Because no light can get out, we can't see black holes. The presence of a black hole can be inferred through its interaction with other matter and with electromagnetic radiation such as visible light. Scientists can see how the strong gravity affects the stars and gas around the black hole.

What's inside a black hole? There are only assumptions. Black hole has a very small volume and very high density. The boundary of a black hole in the space is its event horizon. We cannot glimpse what lies inside the event horizon of a black hole because light or material from there can never reach us. One hybrid approach was put together by Yakov Borisovich Zel'dovich, Jacob Bekenstein, and especially Stephen Hawking. Without a quantum theory of gravity, they used particle physics in combination with general relativity to show that the Event Horizon has a non-zero temperature and therefore glows, albeit very faintly. This glow is known as Hawking radiation; it arises when particles are created in the intense gravitational field (e.g., one electron and one positron, pairs of photons). The very strong gravity of black hole distorts space and time around it. The closer to the black hole, the slower time passes. Current theories predict that all the matter in a black hole is piled up in a single point at the center, but we do not understand how this central singularity works. This is one of the most important unsolved problems in physics.

Where does the things goes which are sucked in black hole? Outside the event horizon, an object can escape the black hole's gravitational pull if it's moving sufficiently fast; inside, it would need to move faster than light-speed. It is a forbidden by the laws of nature (speed of body can not exceed the speed of light in vacuum). Gravity of black hole pulls so much that no fast particles and even light can not get out. As object fall toward the black hole, it moves faster and faster, accelerated by its gravity. The front of the object feels a stronger gravitational pull than back, because it is closer to the black hole. As a result, object is stretched apart. For small black holes, this stretching is so strong that object is completely torn apart before it reaches the event horizon. If object fall into a supermassive black hole, it remains intact, even as it cross the event horizon. But soon thereafter object reach the central singularity, where it squashed into a single point of infinite density. The object has become one with the black hole.