Project Information

Topic: Black holes
Presentation Format: Website

Research / Information

Explanation of Black Holes:

What are and are not black holes? Black holes are large containers of matter packed into tiny areas. Black holes are **NOT** wormholes, this can be a very common misunderstanding of what black holes are. This is proven as they do not provide a fast path straight between two places. They also are not cosmic vacuum cleaners, this is because they do not suck in other matter, their gravitational effects are like those of other objects with the same mass in space **1**.

How Black Holes Get Detected:

Since black holes do not emit nor reflect any light, in fact, their gravitational pull is so immense that they bend light beams. They are very hard to see or find using things like telescopes. If black holes can't be seen easily, how are they found? Scientists mainly find and study black holes based on how they affect their surroundings. Ways they can affect their surroundings are as follows: Black holes being able to have rings around them, which are made of gas and dust, black holes can cause stars to orbit around it in a specific way, and the effect of gravitational lensing, which is when massive objects like black holes can bend as well as distort light from distant objects **1**.

How Time is Distorted by Black Holes:

It is theorized that near black holes time gets slowed down. This is because black holes have **extremely** strong gravitational fields. This effect is due to gravity from black holes curving spacetime in a way that changes the time close to them **2**.

Photograph of Black Holes:

While there are not very many **real** photos of black holes, things such as simulations can exist, or even images that are created using artistic abilities. How did humans get the first ever photograph of a black hole? A team was formed to take on the challenge of capturing a black hole with a camera. They created a network of telescopes called the Event Horizon Telescope (EHT for short). They set out to capture an image of a black hole by improving a technique used to image very distant objects, known as Very Long Baseline Interferometry (VLBI for short). Using VLBI, telescopes around the world

were synced to work together like one big telescope. Each telescope collected data at the same time, and the information was combined using computers to create the first image of a black hole's shadow **3**.

Black Hole's Lifespan:

The lifespan of a black hole starts when the black hole forms. Black holes normally form when very massive stars collapse at the end of their own life cycle. After a black hole has formed, it grows by absorbing mass from the things around it. Black holes die from the shrinking and evaporating of black holes. They will slowly leak the energy known as Hawking Radiation. This eventually leads to the black hole to die out **5**.

Sources

- 1.) Page on Black Holes
  science.nasa.gov

- 2.) Page on How Time is Affected by Black Holes.
  profoundphysics.com

- 3.) Page on the First Black Hole photograph
  jpl.nasa.gov

- 4.) Wikipedia Page about Black Holes
  en.wikipedia.org

- 5.) Page answering questions about Black Holes
  science.nasa.gov