BLACK HOLES

GS107 - ASTRONOMY

PEPPER FERGUSON

Event Horizon Telescope
collaboration et al.

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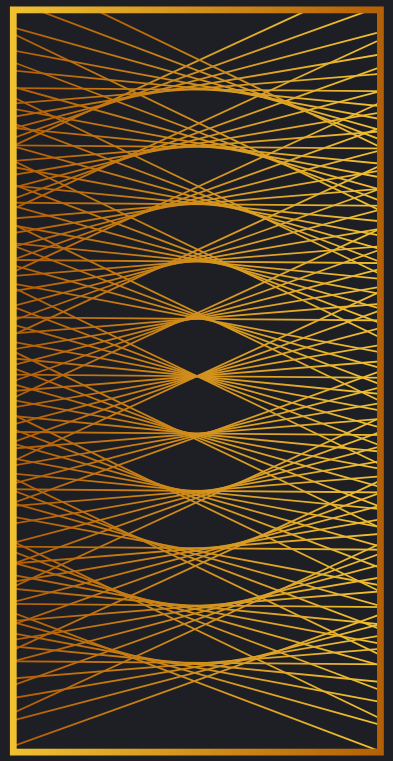


01.

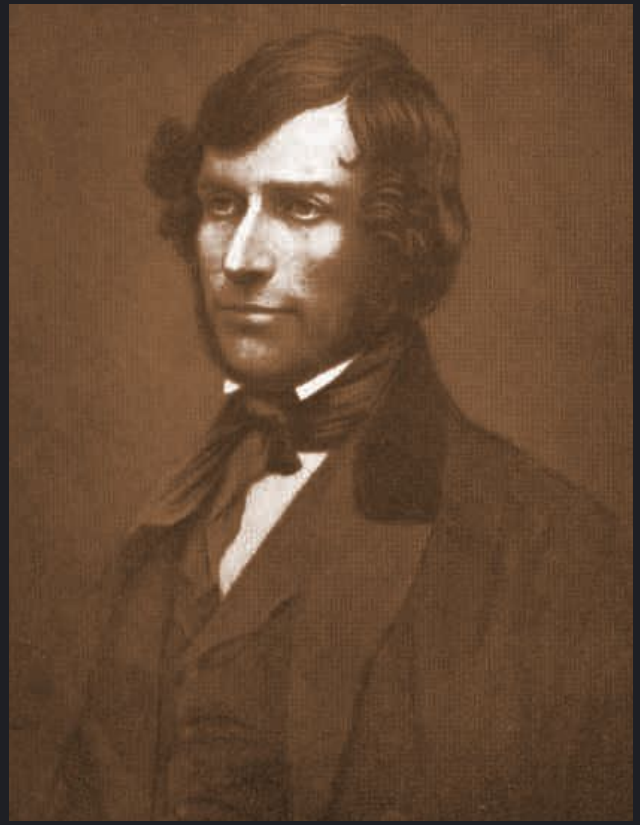
WHO SHOULD YOU KNOW...

Here are the scientists, philosophers, and theorists who study black holes. This is also the basic timeline of black hole theories and discoveries.

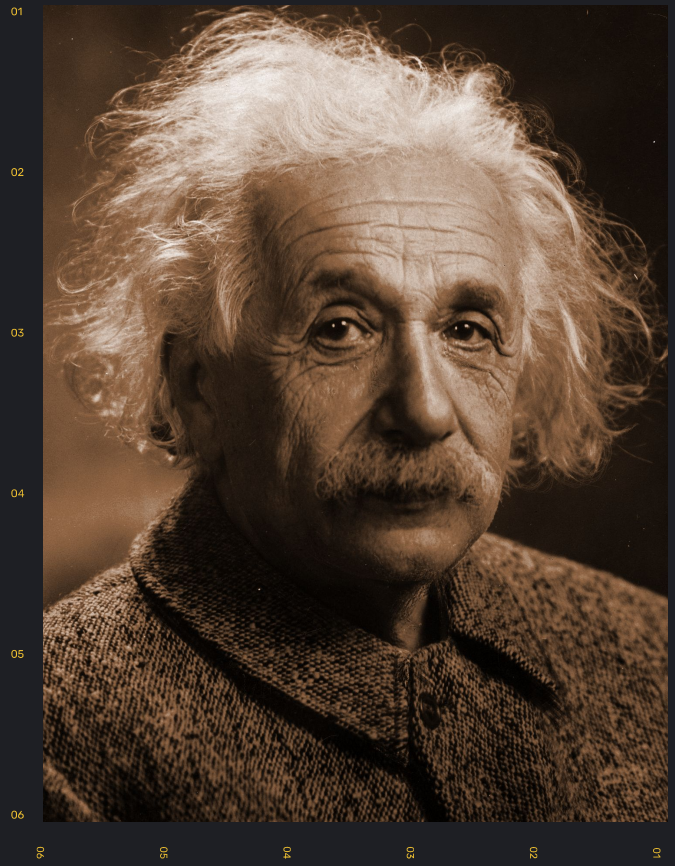
JOHN MICHELL

In 1783 John Michell used Newton’s law of gravity to theorize that there could be an object who’s gravity was so intense that even light couldn’t escape.

He stated the only way to see this invisible object would be by seeing a star orbiting these “dark stars”.



John Michell



Albert Einstein

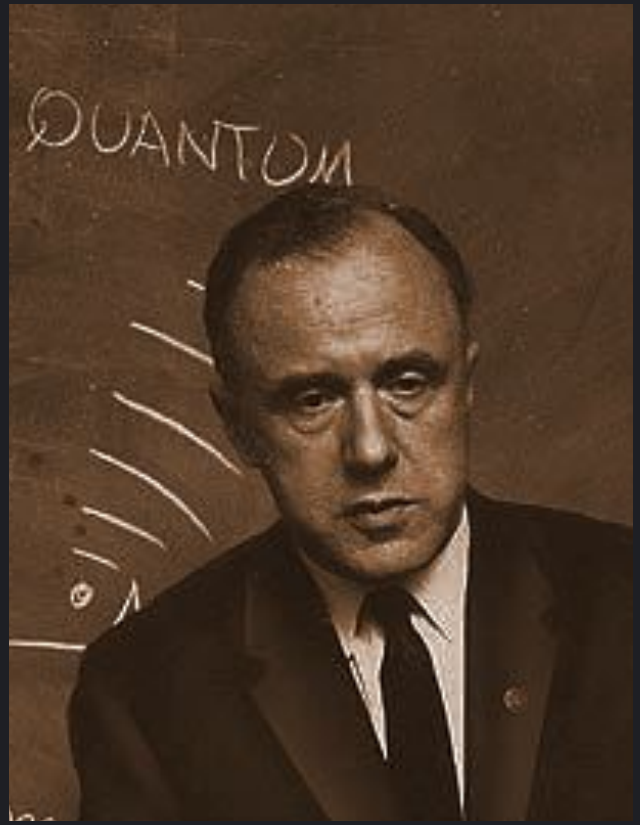
ALBERT EINSTEIN

Albert Einstein theory of relativity predicted the existence of black holes in 1915. Even though he did not believe black holes could exist.

JOHN WHEELER

John Wheeler was the first scientist to coin the term “black hole” at a conference in 1967.

He made the name stick after someone else had suggested “gravitationally completely collapsed star.”



John Wheeler

LOUISE WEBSTER & PAUL MURDIN

Louise Webster

In 1972 Louise Webster and Paul Murdin and a student Thomas Bolton independently announced they found an invisible object orbiting a blue star (HDE 226868).

They identified Cygnus X-1 and it is regarded as the first black hole to be found.

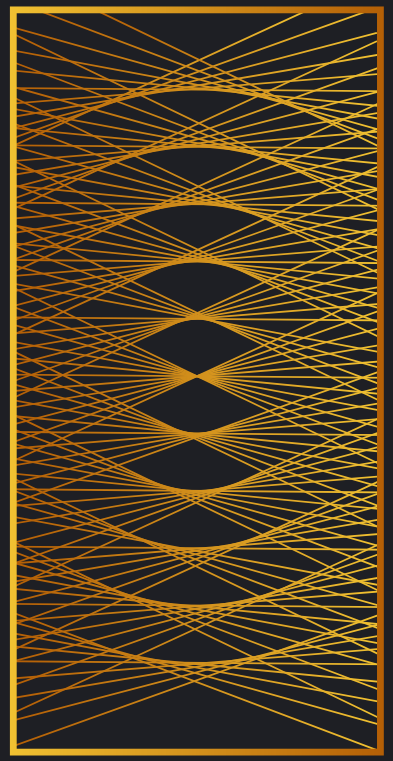
Paul Murdin

STEPHEN HAWKING

According to the Hawking Radiation Theory, that Stephen Hawking created in 1974, a black hole can die.

The basics of the theory is that the black hole slowly disperses its mass into space over time slowly killing it.

Stephen Hawking



02.

WHAT ARE BLACK HOLES?

The basics of black holes. The kinds, layers and the photo.

A black hole a dense object with a gravitational pull that even light cannot escape.

THE FOUR KINDS OF BLACK HOLES

PRIMORDIAL

Small black holes from the size of an atom to the size of a mountain. These black holes are theoretical.

STELLAR

The most common black holes are created by stars that are at least 20 times the size of the Sun.

INTERMEDIATE

Recent research has found the possibility of Intermediate Mass Black Holes (IMBHs) that are starting at 36 thousand times the size of the Sun.

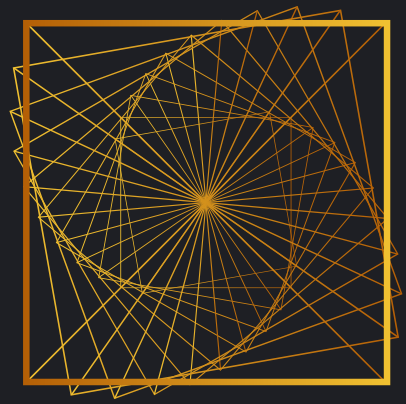
SUPERMASSIVE

The largest black holes that are 1 million times the size of the Sun.

THE LAYERS OF THE BLACK HOLE

THE EVENT HORIZON

There is an outer and inner horizon. The event horizon is the point of no return. Once an object is within the event horizon it will be sucked into the black hole.



THE SINGULARITY

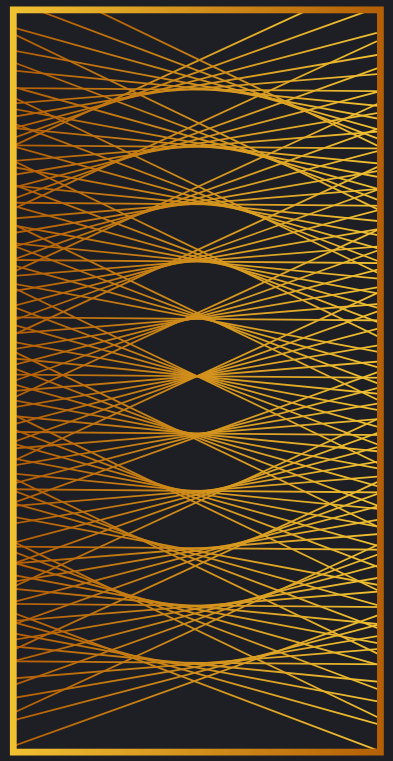
The singularity is a single point in time and space where all of black hole’s mass lies.

Event Horizon Telescope collaboration et al.

THE FIRST PHOTO OF THE BLACK HOLE

The black hole itself cannot be seen but we can see the hot disc of material that is encircling the black hole.

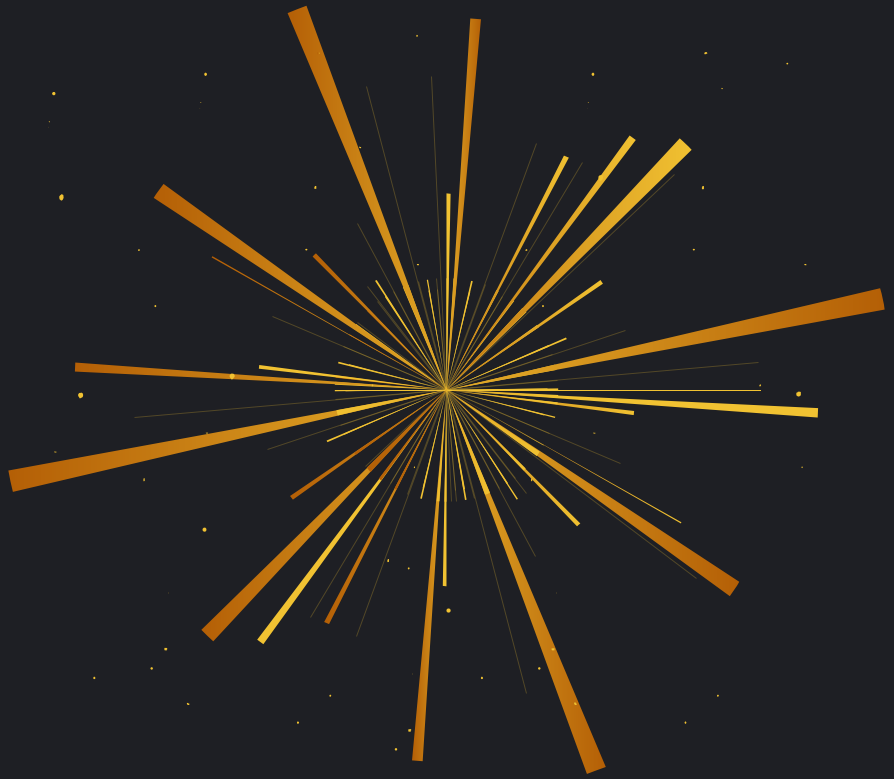
This is the first photo of a black hole taken in April 2019. Meet M87.



03.

HOW DO BLACK HOLES FORM?

Black holes possibly form in multiple ways. This is one reason we have different sizes of black holes.



STELLAR BLACK HOLE

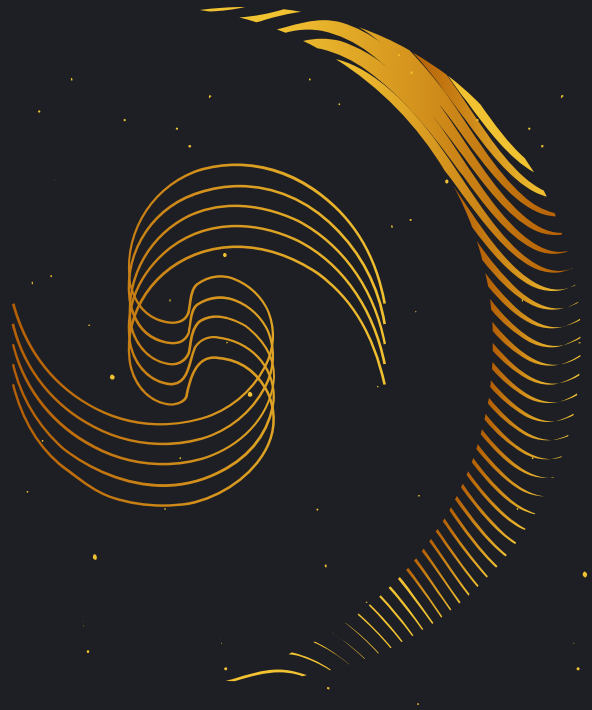
Stellar Black Holes are formed from a large sun, more than 20 times the size of our sun, collapsing in on itself. The nuclear reactions collapse, the outer surface is thrown out creating a supernova and the remainder of the core collapses becoming so dense it creates a black hole.

INTERMEDIATE BLACK HOLES

Intermediate Black Holes (IMBHs) are possibly created when stars in a cluster collide in a chain reaction.

They may also be in the center of Dwarf Galaxies.

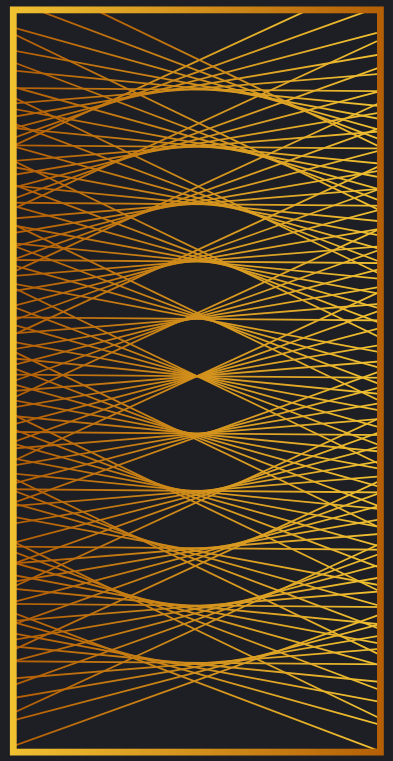
There is suggestion that they may be 36,000 to 316,000 solar masses



SUPERMASSIVE BLACK HOLE

Supermassive black holes have a few theories on their creation.

- Multiple black holes merging
- A large gas cloud collapsing
- A stellar cluster, group of stars, collapsing
- Clusters of Dark Matter



04.

FUN BLACK HOLE FACTS

Black holes are fascinating here are some fun facts.

TIME

The closer you get to the black hole the faster you move. The faster you move the slower time moves.

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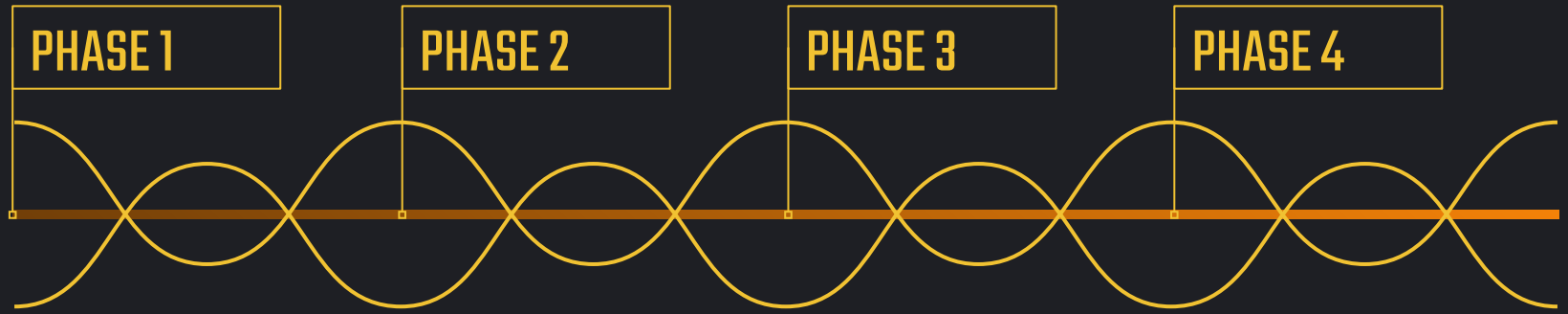
SPAGHETTIFICATION



Because the closer you get to the singularity the faster you move if you are falling feet first your feet will be moving faster than your head and this causes spaghettification.

DO BLACK HOLES SUCK?

- Black holes do not suck. Objects fall into them just like anything with gravity. Like the Earth.
- If the Sun was replaced by a black hole the same mass the Earth would not get sucked in.

THE MILKY WAY

The closest black hole is “The Unicorn” at 1,500 light years and was found in 2021

Astronomers assume there are over 10 million black holes in the Milky Way

There is a supermassive black hole, Sagittarius A*, in the center of the Milky Way

THANKS

Do you have any questions?

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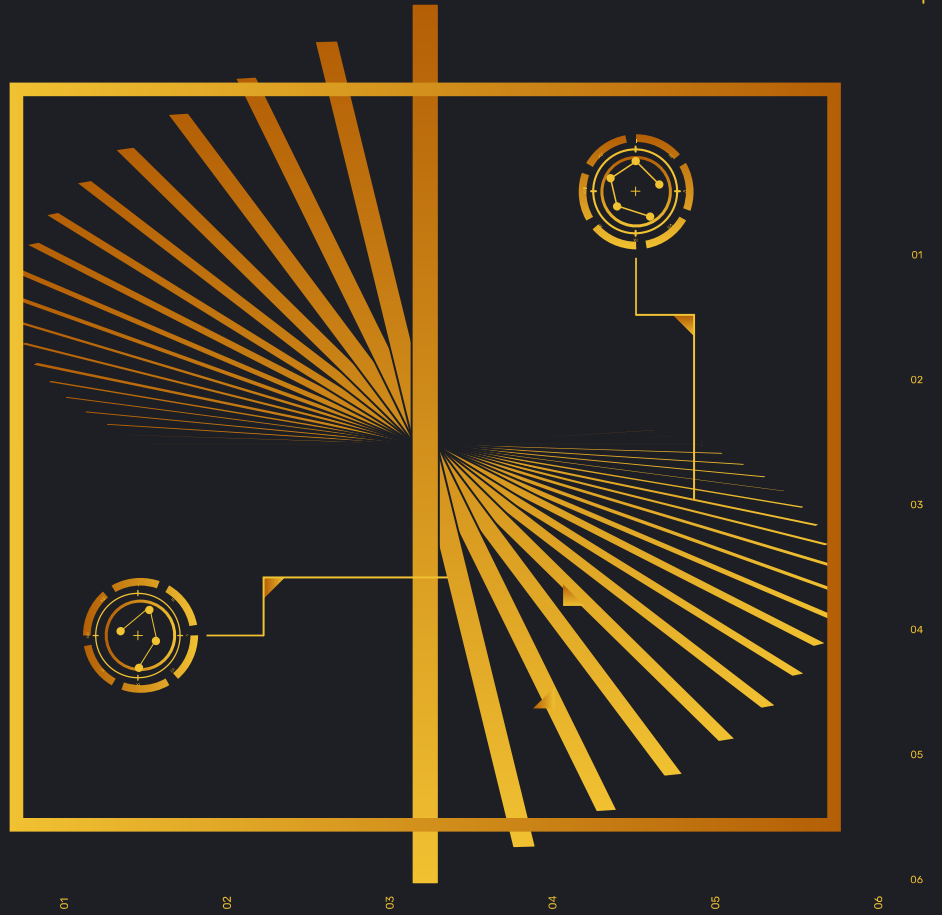

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