

How are photons affected by gravity?

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all answers from physicist

- Photons aren't acted on gravity directly by gravity, rather gravity warps the time-space directly around it causing the light to bend towards a large mass.
- Because photons are massless at rest, they aren't affected by gravity in the same way other particles are. However, light can still be bent due to the fact that it still has inertial mass and therefore momentum, and gravity can affect particles that have momentum. This is the foundation of Einstein's Theory of General Relativity.
- GR describes gravity as bending space time. So while photons are not affected by gravity, they appear to have bent paths as they pass through bend space time.

Did an apple really fall on Isaac Newton's head?

- It likely did not literally fall on him, but the act of an apple falling was his influence for the Theory of Gravity.
- This is a legend. We don't really know, but he could have been inspired by such an event. Newtons work is more complicated than it seems. He didn't discover what goes up must come down. He came up with the mathematical principles at work and had a brilliant approach.
- what people believe was a urban legend is actually somewhat proven to be true. Isaac Newton himself commented in an interview that while he was sitting in a garden he saw an apple fall. Unfortunately, or fortunately for him, the apple never ended up hitting his head. Nonetheless, his passion for gravity started because of that apple. One apple revolutionized physics for centuries.

Who discovered gravity, and how?

- Newton realized that some force must be acting on falling objects like apples because otherwise they would not start moving from rest. Newton also realized that the moon would fly off away from Earth in a straight line tangent to its orbit if some force was not causing it to fall toward the Earth. The moon is only a projectile circling around the Earth under the attraction of gravity. Newton called this force "gravity" and determined that gravitational forces exist between all objects.

Who discovered or answered "Whether light is in a form of wave packets or actual photons with mass?"

- Up until Einstein's explanation of the photoelectric effect, the theory was that light only existed in wave form. But the photoelectric effect demonstrated that light could physically interact with other particles as a quantized particle of light (a photon).
- Max Plank is credited as the father of modern QM. He developed the quantum thing to describe heat changes, rather than light. He considered it to be a mathematical trick. mEinstein implemented it to describe the photoelectric effect(where packets of light

energy were fed and released from metal)

- The concept of photons was developed by Albert Einstein

Who theorized black holes/wormholes?

- John Michell and Pierre-Simon suggested the existence of an "invisible star"
- We call the region of space for which this condition is true a "black hole" (a term first coined by American scientist John Wheeler in 1969)
- Hermann Weyl theorized wormholes, but again, John Wheeler coined the term "wormhole".
- Kip Thorne thought of wormholes.

How did Stephen Hawking work in this area?

What is the Black Hole Information Paradox?

- That paradox comes from Hawking's theory that if we have an object, like a green ball and we throw it into a black hole, we can't possibly know what color the ball is once it's in the black hole, or if it's even a ball anymore, unless we get inside the black hole itself (a very bad idea). However, quantum mechanics says that all information is preserved, so it's in direct conflict. However, Hawking has reversed his stance on information not being conserved, so that information does still exist, but it may not be in the same format that is went in.

What is Stephen Hawking known for?

- He is known for his explanations explanations of the fourth and fifth dimensions of space.
- Hawking is best known for his work with black holes, and even had a type of radiation named after himself.
- Stephen Hawking was involved in the idea that black holes do indeed emit radiation, but he is famous for making science popular. That when something enters a black hole, all information about it is lost, which violates the laws of physics of the conservation of information.

Is a black hole a hole?

- A black hole is not a true hole in a two dimensional sense, where you can look through it or see both sides of the hole. Instead, it consists of a singularity, with a radius around it called the event horizon, where the pull of gravity is so intense that nothing can escape it. We don't really know what happens to objects that fall into a black hole, and the nearest one is 1600 light years away, so it's hard to test and observe.
- A black hole gets its name because theoretically, no light can be seen from the area around the black hole, Because light cannot
- escape

<http://science.howstuffworks.com/dictionary/astronomy-terms/black-hole1.htm>

- A black hole is a region of space that has a high gravitational attraction that basically anything caught in it is stuck and sucked in. We don't know if there's anything on the other side because anything we'd send would be crushed and any signals would be trapped due to the high warping of the time-space-space immediately around a black hole.

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- No. A black hole is an object — typically a collapsed star — whose gravity is so strong
- Gravity can bend light

What do black holes do to things?

- All matter that ventures inside the event horizon is crushed down to a single point, at that its escape velocity exceeds the speed of light. Since nothing is known to exceed the speed of light, nothing can escape from a black hole.

Can you bend light without touching rays? which matter is said to have reached infinite density.

Do black holes bend time and space?

- Yes, black holes slow down time and space.

Is time travel with black holes possible?

- I really don't know much about SR. Such a feat would be very hard and currently implausible.
- Yes, spacetime is significantly distorted in the area around a black hole, and so a ship orbiting a black hole would be experiencing time slower than someone back on Earth. Combined with traveling at near speed of light and you could certainly accelerate the gap in time experienced by people in the ship relative to Earth. In order to accomplish this, a lot has to happen to advance space travel, and figure out how to travel near the speed of light without destroying our bodies.
- <http://www.youtube.com/watch?v=i0cVdPHOIxw>
- It is possible but impractical, because travelling to a black hole wouldn't be easy.

How do we know if we are right?

- We don't know if we are right in decades, that's why those explanations are called theories and not scientific law. Theories are always up for being corrected and altered when we discover more information.
- We don't! That's the beauty of science. Making constant progress based on the discoveries of the past is what scientists do everyday. As Newton put it, "If I have seen further it is by standing on the shoulders of giants."
- It won't be. The beauty of physics is that old idea's are just as important as new idea's, even if they are not as accurate or correct as good idea's. Einstein superseded Newton's work with special relativity but it doesn't mean that we need to study only Einstein's work, since everything new is based on something old. We literally use methods from the 1700's today as some of the most useful tools we have.

Do photons experience time?

- a photon does not experience the passage of time, and it does not experience the passage of distance either. You can't move a massless consciousness at the speed of light in a vacuum.
- Read more at: <http://phys.org/news/2011-08-photons-view.html#jCp>

Would everything freeze or just time if Earth were traveling at the speed of light?

Is it true that light doesn't age?

- Light doesn't age because it travels at the speed of light. it can be absorbed and "die" however.
- Not that I know of. The redshift(light losing frequency over distance) is attributed to the

difference in velocity.

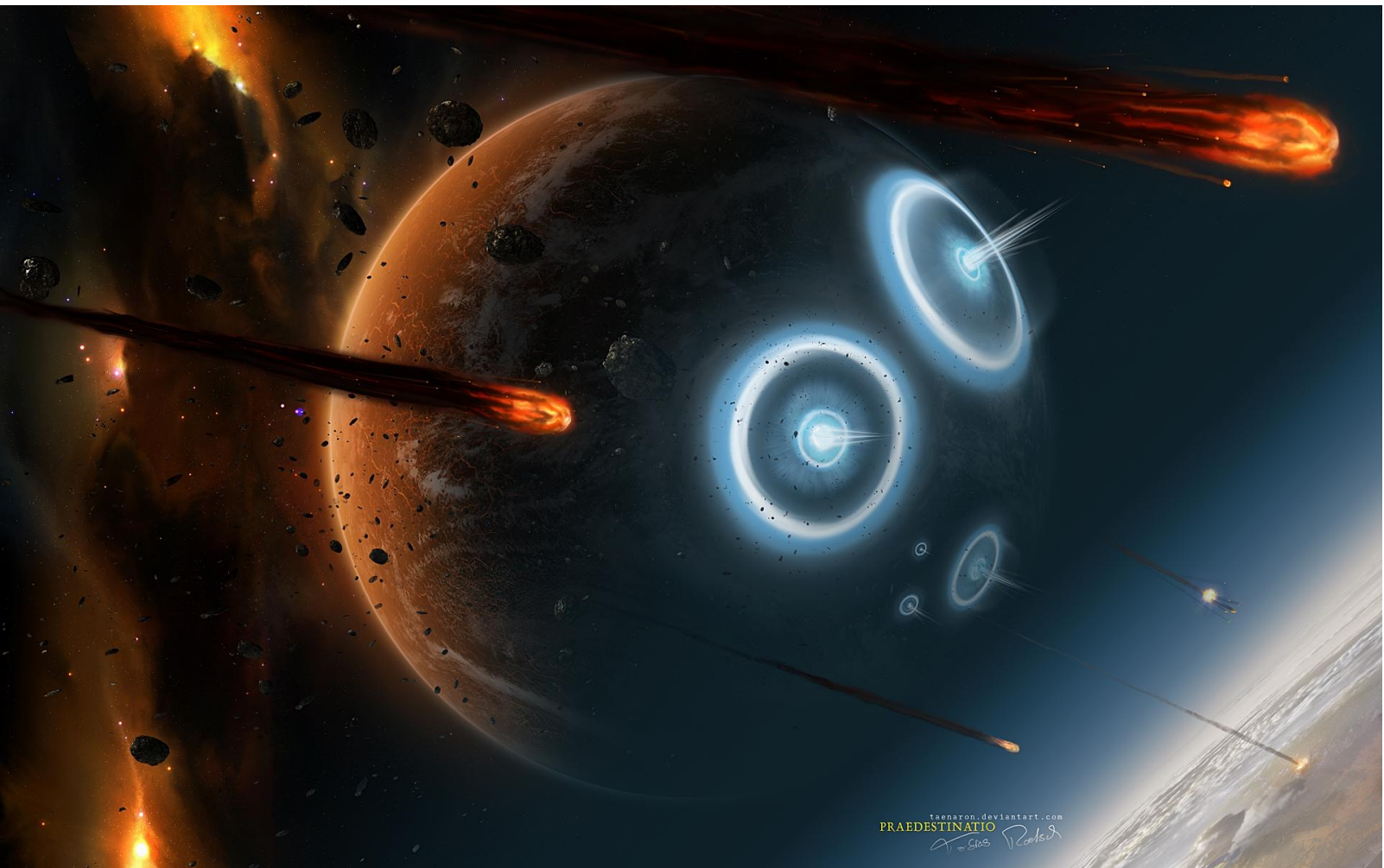
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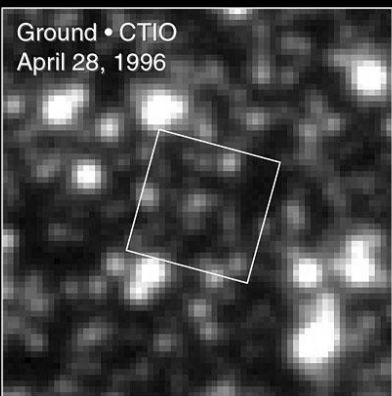
Purple= Juliana

Orange = Eula

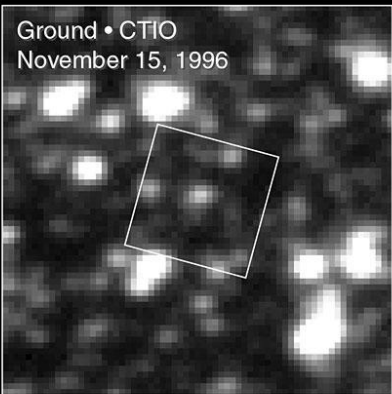
Green = Oscar



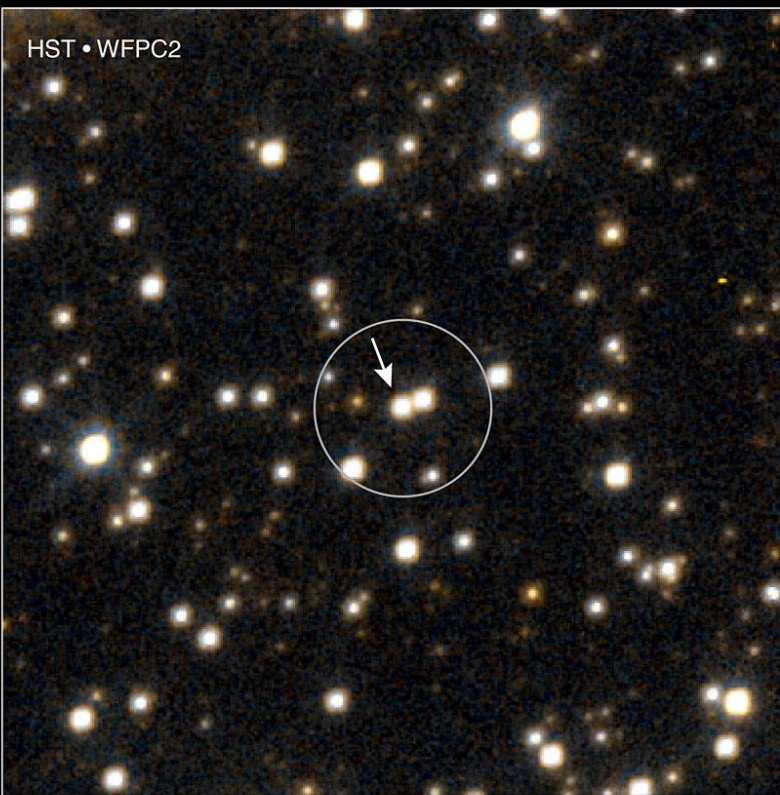
Ground • CTIO
April 28, 1996



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November 15, 1996

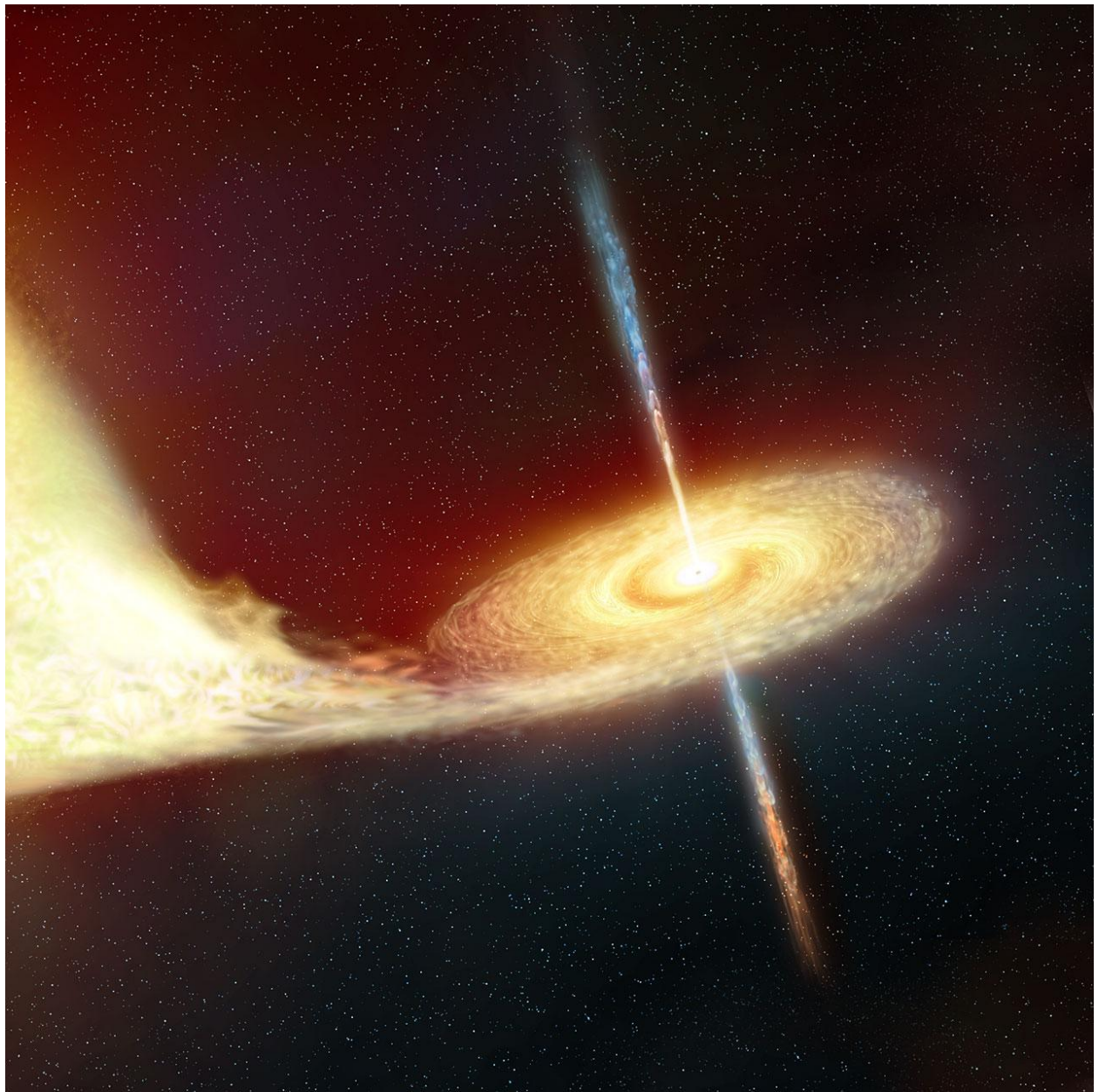


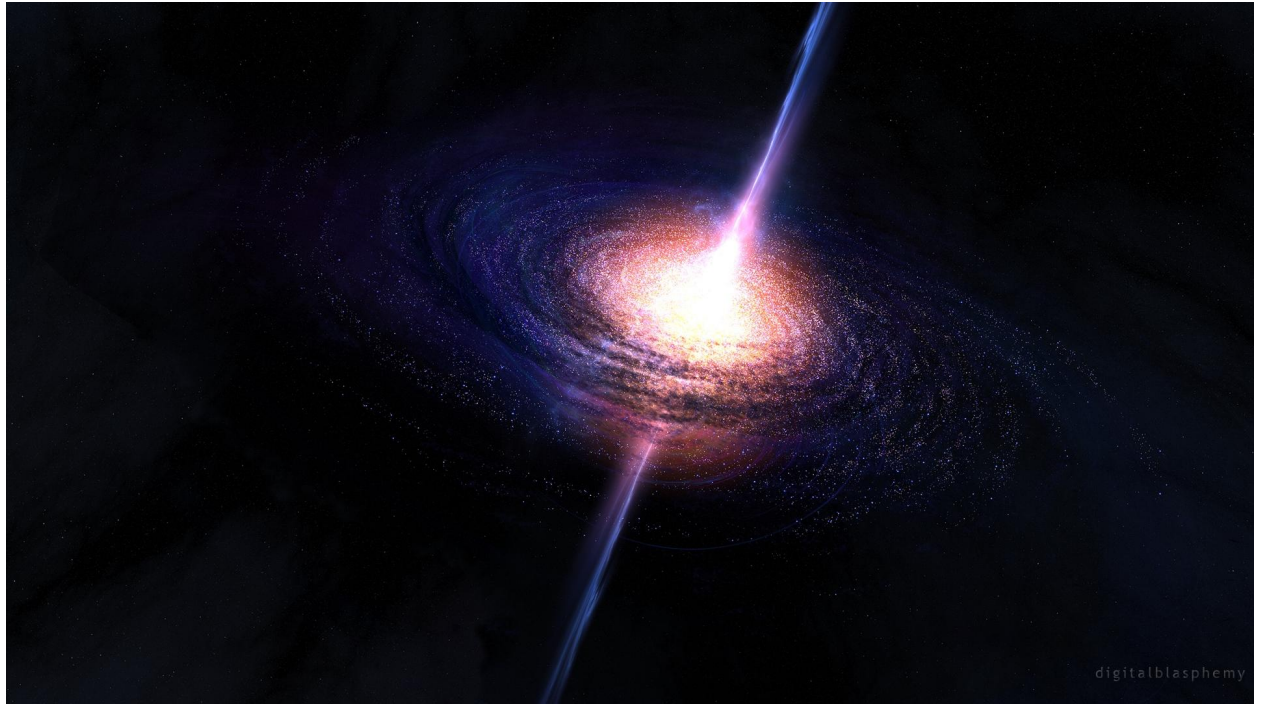
HST • WFPC2

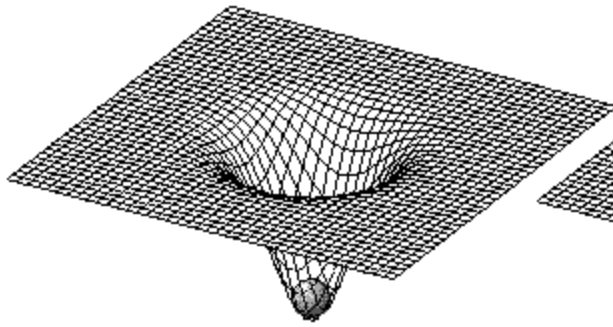


Microlens Event MACHO-96-BLG-5
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NASA and D. Bennett (University of Notre Dame) • STScI-PRC00-03



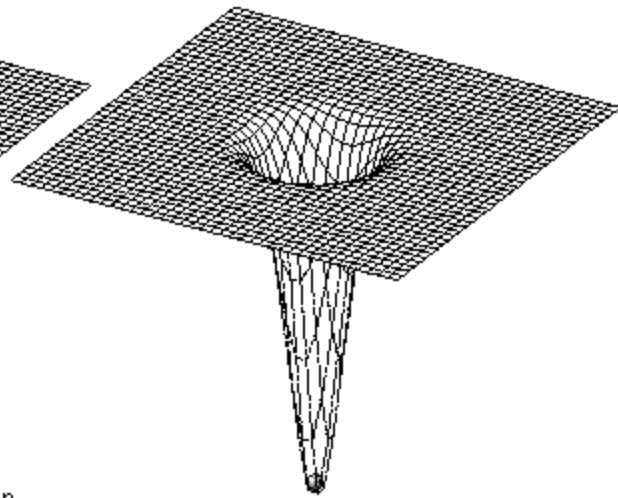




Usual star

General Relativity :

Einstein describes gravity as a deformation
of space-time around a massive object.



Neutron star

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