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- The European Section - Mathematics & Sciences -

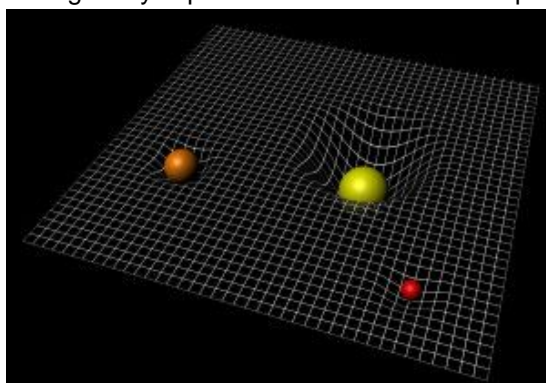


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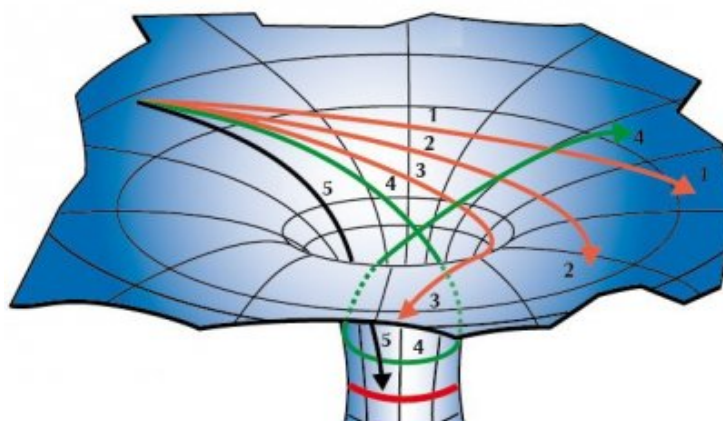
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Universe is huge and it contain many objects that humans do not know or yet do not understand. Therefore, we tried to understand some of them. In this topic, we will explain you what is the difference between black holes, white holes, and wormhole. For each of them, we asked us a few questions, who and when they discovered them, later, we wondered how they were created and how they work.

Black Holes are supermassive celestial object that causes a very high gravitational attraction that attracts matter and photons to its singularity (when they exceed the event horizon, even photon cannot escape the black hole). Karl Schwarzschild discovered them in 1916 but Albert Einstein discovered how they work working on his general relativity theory between 1907 and 1915. In the general relativity theorem, space is represented with parallels lines: geodesics (picture 1); it is distorted depending on the weight of the objects presents. Black holes deformed geodesics toward its singularity so much, that after a limit, the event horizon, nothing can escape from its attraction whatever its path (picture 2). That is why black holes are represents as a gigantic black sphere, the circumference of the circle is the event horizon, and its singularity is placed in the center of the sphere.



White Holes are the inverse of a black hole, matter and photons come out from its singularity (it cannot be entered from the outside). Sometimes, the Big Bang is considered as a white hole. Igor Novikov imagined this theory in 1964. Novikov thought that if an object as black holes can exist, that mean that its opposite could exist. Therefore, a white hole produce a huge repulsion force. In deduction, white hole could be represented as a white sphere because it is constantly ejecting photons from its singularity.



What if a black hole when to be stuck by its singularity to a white hole' singularity. If that's possible, that mean that it should be possible to pass through the "double" singularity and travel in space spending less time than doing the direct travel. A wormhole is a union between a black hole and a white hole. As an analogy, wormholes can be consider as a bridge between two points in space (picture 3). If you can imagine the previous example, you were thinking about the famous Einsten-Rosen Bridge thought in 1935 by Einstein and Rosen obviously. Because of the speed of light, if we look at very distant stars, we see them as they were in the past. Thus, a wormhole connecting 2 distant regions of space connects 2 distant eras in time, so it's a bit like a time travel.

