INTO A BLACK HOLE  
- Payal Mangla, BVCOE



It is sometimes so difficult to believe or even think about the existence of some things, and that’s because these are so different from normal that our mind is unable to accept them or the reasoning behind them. This is somewhat true for Black Holes, one of the strangest things ever dreamt or seen by science.

Black Holes were first of all pointed out in 1783. It was brought forward that there are some regions in space that could not be seen but a very strong impact of force could be felt around them. This was the gravitational force due to a massive star, so strong that even light could not escape. Such regions or objects of space were then called Dark Stars and are now called Black Holes.

Suppose there is a massive star that has burnt up its nuclear fuel completely, then if it cools and shrinks below a critical size, it will literally end up making a hole in space that light can’t get out of, i.e., a Black Hole. From the outside you can’t tell what is inside a black hole. Even when you throw something inside a black hole and once its inside, you are wrong if you say that you know what you threw inside, because all that black hole remembers is the total mass and the state of rotation. Everything else gets lost inside. The force experienced due to a black hole varies with positioning; it is strongest at its boundary which is called the Event Horizon. Even light gets trapped inside at this region, and since nothing can travel faster than light, everything else also can be pulled inside. Once you fall in a black hole, as for the outside world, you would be lost forever. The only thing that remains in the black hole is information. All the mass inside the black hole gets converted into energy (E= mc squared) and energy finally into information. So, bigger the black hole more is the information inside it. But it was also discovered that particles could leak out of a black hole but on a very small scale, if they somehow happened to travel at a speed greater than light. This was brought forward after the Heisenberg’s uncertainty principle; you may know the position of a particle, that it’s in the black hole, accurately, but then, not the speed it may have inside.

If particles escape from black holes, they will eventually start losing information and as a result, will shrink and may even disappear. But the problem is that what comes out of a black hole has no relation with what goes in, i.e., something random will come out. The information for what fell in is completely lost apart from the total mass. Right now we don’t have any black holes near us but what if we do in future? It is therefore very important to determine whether information really gets lost in black holes, whether it can be recovered or preserved.

