Missing Supermassive Black Hole

Why in news?

A supermassive black hole, which is estimated to weigh up to 100 billion times the mass of the Sun, is seemingly missing.

What is the finding?

- Scientists have been looking for the black hole using NASA's Chandra X-ray Observatory and Hubble Space Telescope.
- They have so far found no evidence that it is anywhere to be found.

Where is it supposed to be?

- The black hole is supposed to be located in Abell 2261.
    - Abell 2261 is an enormous galaxy cluster that is about 2.7 billion light-years away from the earth.
- One light-year is the distance that a beam of light travels in one Earth year, which is 9 trillion km.
- On the scale of the Universe, astronomers measure the distance from stars and galaxies in the time it takes for light to reach us.
- So, when we look at a celestial object, we are looking at how it appeared that long ago in the past.
- At 2.7 billion light-years away, the Abell galaxy is at an overwhelmingly large distance away from the earth.

What could have happened?

- Every large galaxy in the universe has a supermassive black hole at its centre, whose mass is millions or billions of times that of the Sun.
- The black hole at the centre of our galaxy, the Milky Way, is called Sagittarius A*, and is 26,000 light-years away from Earth.
- Scientists have been using data gathered in 1999 and 2004 to look for the centre of the Abell galaxy.
- But they have so far been unable to find its black hole.
- A reason for this could be that Abell's black hole has been ejected from the centre of the galaxy.
    - This is based on 2018 data from NASA's Chandra Observatory.
- This may have happened because of the merging of two smaller galaxies to

form Abell.
- In the process, both of their black holes merged to form an even bigger black hole.

What is 'Recoiling' black holes?

- When two black holes merge, they release what are known as gravitational waves.
    - These are invisible ripples travelling at the speed of light, which squeeze and stretch anything in their path.
- During the merger, when the amount of waves generated in one direction is stronger than another, the new big black hole can be sent away from the centre of the galaxy into the opposite direction.
- This is known as a "recoiling" black hole.

What is the significance?

- So far, scientists are yet to find definitive evidence for recoiling black holes.
- They are yet to discover whether supermassive black holes can merge and release gravitational waves.
- As of now, only mergers of significantly smaller black holes have been verified.
- So, if the current hypothesis for Abell galaxy turns out to be true, it would mean a major breakthrough in astronomy.

Source: The Indian Express