




drishti

Mains Practice Questions

 drishtias.com/mains-practice-question/question-247/pnt



Q. Why capturing visual of a black hole was a challenge? Discuss the significance of first visual from Event Horizon Telescope. (250 words)

19 Apr, 2019 GS Paper 3 Science & Technology

Approach

- In introduction discuss the image captured by scientist and its background.
- In body examine why capture of black hole visual was a challenge, how it was solved.
- Discuss the significance.
- Conclude with future projects in this direction

Answer

Introduction:

- Astronomers have captured the first image of a black hole, heralding a revolution in our understanding of the universe's most enigmatic objects. Black holes were first predicted by **Einstein's theory of relativity** – although Einstein himself was sceptical that they actually existed.
- Since then, astronomers have accumulated overwhelming evidence that these cosmic bodies exist, including recent detection of **gravitational waves** that ripple across the cosmos when pairs of them collide.

Body:

Black holes are bodies whose density is so great and gravity so strong that “all light emitted from such a body would be made to return towards it.” In such case, any endeavour to capture the visual of a black hole remained difficult. In doing so, scientist faced two main challenges:

- Gathering enough light from a distant black hole.
- Having enough magnifying power to resolve the details.

These challenges were solved by using multiple large radio telescopes scattered throughout the world: by combining their observations, astronomers effectively created a single telescope with a lens as big as the planet. Further, all the signal were saved and synchronized within a microsecond, to get an accurate visual of black hole and rendered into a visual.

Significance of the image capture:

This achievement will further bolster **Einstein's theory of general relativity**, which describes gravity as a consequence of the warping of space-time. And the newly unveiled images should help scientists better understand how black holes tick, and how the biggest ones black hole shape the evolution of their host galaxies. All these would prove essential to understand the origin of life on earth, and finding **goldilocks zones**: that is the liveable planets.

Conclusion

Though a great achievement in itself, but there is a long road still to cover, which is being covered by many project like Nuclear Spectroscopic Telescope Array (NuSTAR) , LIGO and Laser Interferometer Space Antenna mission. The finding from these projects is expected to give further insight into working of celestial bodies.