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Q97

Recently, scientists observed the merger of giant 'blackholes' billions of light- years away from the Earth. What is the significance of this observation? (a) 'Higgs boson particles' were detected. (b) 'Gravitational waves' were detected. (c) Possibility of inter-galactic space travel through 'wormhole' was confirmed. (d) It enabled the scientists to understand 'singularity'. Official key: B.

UPSC Civil Services Prelims 2019 · General Studies · 2 marks · Art and Culture

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Explanation**(a)**

(a) Higgs boson particles were detected at the LHC in 2012, not by watching distant black-hole mergers. Not the key.

(b) Official key

(b) Gravitational waves. LIGO's 2015 (announced 2016) detection, and later events, were from merging black holes billions of light-years away. That is the official key.

(c)

(c) Wormhole inter-galactic travel was not confirmed by those observations. Not the key.

(d)

(d) Singularity inside a black hole remains a theoretical region; merger detections do not "enable understanding of singularity" as the keyed significance. Not the key.

Summary

Official key is (b). Binary black-hole mergers are the source of the gravitational waves LIGO/Virgo detected. Higgs, wormholes and singularity are other physics stories. Honour (b).

Related possible facts

These can be asked in a future Prelims paper.

LIGO

Laser Interferometer Gravitational-Wave Observatory

GW150914

First detected binary black-hole merger

Einstein 1916

General relativity predicts gravitational waves

Nobel 2017

Weiss, Barish, Thorne for LIGO and gravitational waves

Multi-messenger

Later neutron-star merger GW170817 with electromagnetic counterpart

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