LIGO to Publish Paper on Analysis Techniques

Why in news?

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- The LIGO (Laser Interferometer Gravitational-Wave Observatory) Scientific Collaboration detected gravitational waves in 2015.
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- It has recently announced that it would publish a detailed explanation of how it analyses the noise in its detectors.
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What was the 2015 discovery?

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- Gravitational waves are ripples in the fabric of space-time, arising from the merger of a pair of black holes in distant space.
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- LIGO’s 2015 announcement of the discovery of gravitational waves was an exciting finding in physics for decades.
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- The discovery confirmed a prediction made by Einstein.
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- It stated that space-time itself can squeeze and stretch in rhythmic waves, when deformed by cataclysmic events like collision of black holes.
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- The collaboration’s founders were awarded the Nobel prize in physics in 2017. Click here to know more.
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What were the further observations?

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- Since detecting the binary black hole (BBH) merger, the LIGO Scientific Collaboration (LSC) has made six such observations.
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- Five of these were mergers of black holes in very different locations in space and with very different characteristics such as mass.
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- Another was the merger of a pair of so-called neutron stars (binary neutron stars).
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- The last few detections have been done in conjunction with another detector, Virgo (Italy-based).
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What is the need for LIGO's explanation now?

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- **Challenge** - LIGO’s detectors aim to measure a shortening of space equivalent to about a thousandth of the width of a proton.
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- This sort of measurement is swamped by natural thermal vibrations, known as noise.
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- This makes picking out the signal from a gravitational wave tricky and challenging.
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- The collaboration thus used sophisticated analysis techniques to remove this noise.
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- Also, after the first discovery, the LSC made public its data on these techniques.
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- **Dispute** - Analysing the data, in 2017, a group of scientists questioned the validity of the first detection.
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- Weeding out noise from the signal is crucial in any such experiment.

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- Some claimed that this had not been done properly by the LSC.
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- They argued that the two detectors belonging to LIGO were correlated and that this led to a correlation in the noise factor.
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- Other scientific investigations also uncovered a number of irregularities in the data.
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- **LSC** - After a long silence, recently, the LSC has thus put up a clarification on its website.
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- The LIGO collaboration is learnt to be in the process of preparing their paper clarifying their approach and explaining the analysis techniques.
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Source: The Hindu, NewScientist

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