Having struck gold, LIGO hopes to detect supernova

Chethan.Kumar
@timesgroup.com

Bengaluru: The Laser Interferometer Gravitational-Wave Observatory (LIGO), which has detected multiple gravitational waves (GWs) bringing Albert Einstein's theories out of the books, is expanding its operations now. Its executive director David Reitze was in Bengaluru, meeting colleagues from the International Centre for Theoretical Sciences here. **TOI** spoke to him. Excerpts:

David Reitze

■ LIGO has struck gold in August. What's next?

We know we've binary black holes and binary neutron stars. So there must be a merger; we want to detect that. Also, we want supernovas — an astronomical event that occurs during the last stellar evolutionary stages of a massive star's life. Our detectors aren't very sensitive to supernovas because the energy released by supernova in gravitational waves is just a billionth of what comes out of a black hole merger. We're sensitive only to our galaxy, we have to see one in our galaxy. If we are lucky, we'll catch it.

■ The first detection in 2015 was exciting. Did you expect it so early?

We'd been upgrading our detectors for four years and had just turned them on, on September 14. The next day, we saw a wonderful gravitational-wave signal from two merging black holes. I was saying we wouldn't detect a wave until 2017 or 2018, did not think we'll do it immediately. I was very happy I was wrong.

■ How critical is the proposed detector in India for LIGO?

We collaborate with Virgo observatory in Italy. There's a project coming up in Japan. In India, we are working hard to get a detector, hopefully, ready by 2025. Having a detector in India improves our ability to localize events in the sky. When gravitational-waves' source is detected by our detectors (and depending on where they are), we are able to point in the direction in the sky more accurately. India having a detector improves that dramatically.

■ Are the detectors sensitive enough? Is there more work in that direction?

We're in the commissioning mode now. We've a series of complicated campaigns where we go into vacuum and close the detector and operate it again to see if we have made any improvements. This process is carried out a couple of times. The goal is that when we come back online, we are at least 30%-40% more sensitive. If you improve sensitivity by a factor of two, then you improve the range of where you can see the source by two. This greatly increases the rate of detection.