https://indico.ific.uv.es/event/6178/contributions/15777/

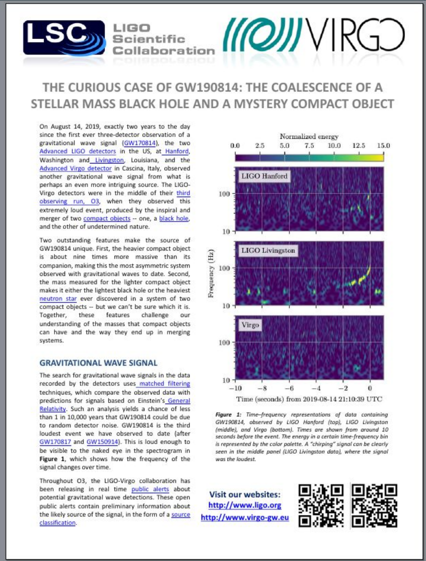
D. Keitel for the LVK: "science summaries"
– *explaining LIGO-Virgo-KAGRA results to the global public*

- Making the **science of gravitational-wave astronomy** and the global detector network ***easier to understand*** for non-scientists, students, and colleagues.
- Not just the basics, but the actual content of ***each of our scientific papers***.
- Disseminated online; used at f2f outreach events, in classrooms, and in student training.
- ***Translations*** are a crucial ingredient to reaching a ***diverse global audience***: bring our science to people in their own languages
- Writing and translating summaries is also very ***beneficial for collaboration members*** (both senior scientists and students) themselves.
- Effort has gathered a lot of momentum in recent years: summaries for each paper, ***translations into 22 languages so far***
- Quotes from translation volunteers:

"my way to give back"
"ma façon de redonner ce que j'ai reçu"

"the opportunity for everyone to understand science"
"l'oportunitat d'entendre la ciència a tothom"

"a culture-affirming experience for the Blackfoot people"



LSC LIGO Scientific Collaboration VIRGO

THE CURIOUS CASE OF GW190814: THE COALESCENCE OF A STELLAR MASS BLACK HOLE AND A MYSTERY COMPACT OBJECT

On August 14, 2019, exactly two years to the day since the first ever three-detector observation of a gravitational wave signal (GW170814), the two Advanced LIGO detectors in the US, at Hanford, Washington and Livingston, Louisiana, and the Advanced Virgo detector in Cascina, Italy, observed another gravitational wave signal from what is perhaps an even more intriguing source. The LIGO-Virgo detectors were in the middle of their third observing run, O3, when they observed this extremely loud event, produced by the inspiral and merger of two compact objects -- one, a black hole, and the other of undetermined nature.

Two outstanding features make the source of GW190814 unique. First, the heavier compact object is about nine times more massive than its companion, making this the most asymmetric system observed with gravitational waves to date. Second, the mass measured for the lighter compact object makes it either the lightest black hole or the heaviest neutron star ever discovered in a system of two compact objects -- but we can't be sure which it is. Together, these features challenge our understanding of the masses that compact objects can have and the way they end up in merging systems.

GRAVITATIONAL WAVE SIGNAL

The search for gravitational wave signals in the data recorded by the detectors uses matched filtering techniques, which compare the observed data with predictions for signals based on Einstein's General Relativity. Such an analysis yields a chance of less than 1 in 10,000 years that GW190814 could be due to random detector noise. GW190814 is the third loudest event we have observed to date (after GW170817 and GW150914). This is loud enough to be visible to the naked eye in the spectrogram in **Figure 1**, which shows how the frequency of the signal changes over time.

Throughout O3, the LIGO-Virgo collaboration has been releasing in real time public alerts about potential gravitational wave detections. These open public alerts contain preliminary information about the likely source of the signal, in the form of a source classification.

Figure 1: *Time–frequency representations of data containing GW190814, observed by LIGO Hanford (top), LIGO Livingston (middle), and Virgo (bottom). Times are shown from around 10 seconds before the event. The energy in a certain time-frequency bin is represented by the color palette. A "chirping" signal can be clearly seen in the middle panel (LIGO Livingston data), where the signal was the loudest.*

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