4th G2Net Training School

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Outreach session

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SCHOOL OF PHYSICS

First step. Let's think about my favourite scientific contents...

PRL 119, 161101 (2017) Selected for a Viewpoint in *Physics* PHYSICAL REVIEW LETTERS week ending 20 OCTOBER 2017

GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral

B. P. Abbott *et al.*[*]
(LIGO Scientific Collaboration and Virgo Collaboration)

(Received 26 September 2017; revised manuscript received 2 October 2017; published 16 October 2017)

On August 17, 2017 at 12:41:04 UTC the Advanced LIGO and Advanced Virgo gravitational-wave detectors made their first observation of a binary neutron star inspiral. The signal, GW170817, was detected with a combined signal-to-noise ratio of 32.4 and a false-alarm-rate estimate of less than one per 8.0×10^4 years. We infer the component masses of the binary to be between 0.86 and 2.26 $M_\odot$, in agreement with masses of known neutron stars. Restricting the component spins to the range inferred in binary neutron stars, we find the component masses to be in the range 1.17–1.60 $M_\odot$, with the total mass of the system $2.74^{+0.04}_{-0.01} M_\odot$. The source was localized within a sky region of 28 deg^2 (90% probability) and had a luminosity distance of 40^{+8}_{-14} Mpc, the closest and most precisely localized gravitational-wave signal yet. The association with the γ-ray burst GRB 170817A, detected by Fermi-GBM 1.7 s after the coalescence, corroborates the hypothesis of a neutron star merger and provides the first direct evidence of a link between these mergers and short γ-ray bursts. Subsequent identification of transient counterparts across the electromagnetic spectrum in the same location further supports the interpretation of this event as a neutron star merger. This unprecedented joint gravitational and electromagnetic observation provides insight into astrophysics, dense matter, gravitation, and cosmology.

You can also think about simpler o more basic ideas...
and get a lot of followers!!

→ Is the 1/x function continuous? ←

Which is my *target public*? Do we care of *everyone*?

Main message

Am I thinking about a long-term *project* or something more exceptional?

Which is *my / their* favourite format?

Which *resources* do I have? Experience... don't care too much: who can help in the project? → *TEAM*

Which is *the initial* level of knowledge?

Key points and *connection* points: outreach is not a scientific article.

Goals: education, fascination, critical thinking, politic decisions, fun...

Why am I going to listen you? → *MOTIVATION*

Example of a recent news in Mathematics: [sorry for potential English typos]

Luis Ángel Caffarelli, Mathematician from Argentina, has been awarded with the Abel Prize 2023. This prize is considered the Nobel Prize for Mathematics and it is the first time it has been given to a Spanish speaker person.

Partial differential equations are equations in which the unknown are functions that depend on more than one variable and that include the proper unknown function and its variation in different directions, the partial derivatives. In a lot of problems we solve these equations considering a fixed place or region: how temperature changes in a square metal plaque. The edge of this place or region is called boundary. Luis A. Caffarelli is the biggest wordwide expert in partial differential equations with free boundary; this means that the boundary is not fixed a priori, its shape is part of the problem we need to solve. A classical example used by Luis A. Caffarelli is how an ice cube melts in a whisky glass, where the ice temperature and the ice cube shape change with time.

→ Proposal for this week...

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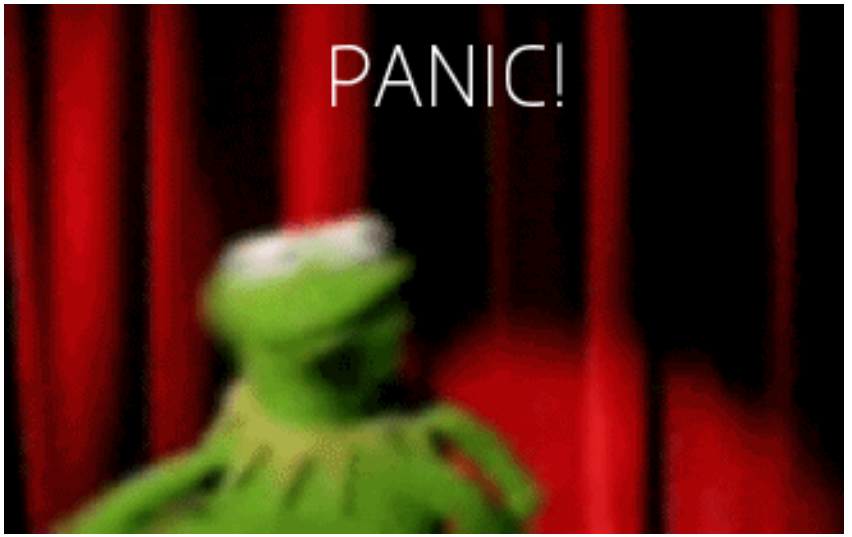
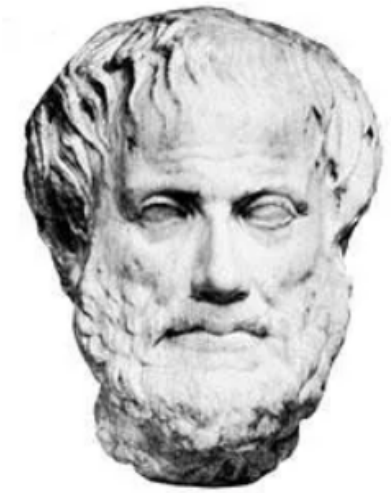


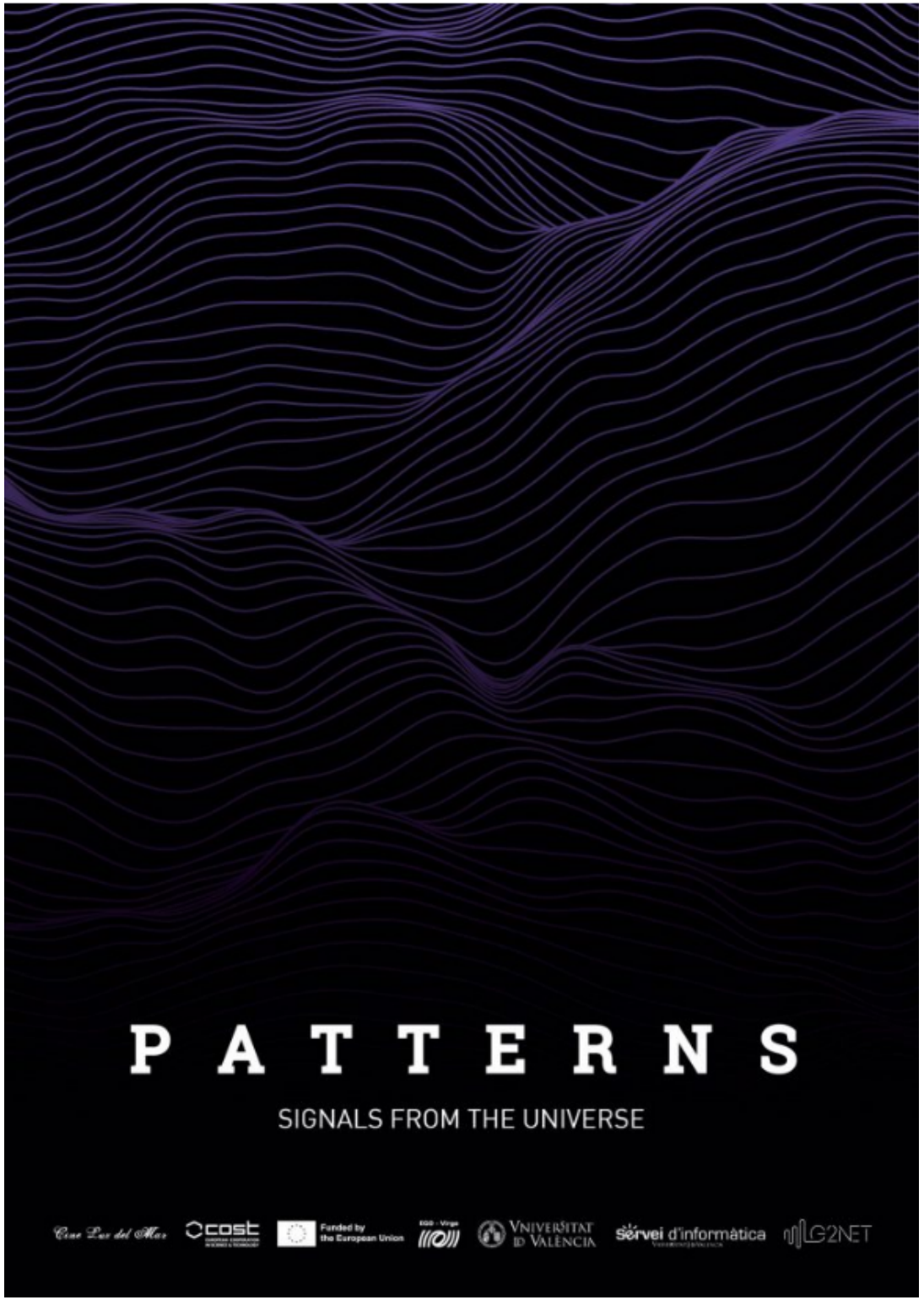
→ *Short* proposal for this week: short *storytelling*

·· Pick up a simple idea. 5 minutes long.
·· Pick up a target public.
·· Pick up one of the following two options: short monologue / video.
Don't panic!!! You just need to write the script...
·· Deliver your script on Thursday to the outreach lecturer by email: isabel.cordero@uv.es (also in my identifier).
·· Announcement of selection of works on Friday at the end of the school, if not too many, or as soon as possible by email.



The Man — Aristotle

Storytelling, what is it?
- Ancient Greek art! Welcome Mr. Aristotle.
- Develop imagination by introducing your public in a story. Not just information, exchange experiences, taking into account who is your audience.
- Use pictures, different characters, humor (!), close references, music and silence, surprises and conclusion... to support your story.
- Science is fascinating enough!!



Patterns – Signals from the Universe, outreach product financed by G2net – science and people doing science.

·· Filmed in English, texts and subtitles in English: more than 280 views.
https://www.youtube.com/watch?v=bFgMgrE64rw&list=PLRQChI0vpMP7NKYbImJXsvNtIF-C_tj-l&index=2

·· Filmed in English, texts and subtitles in Spanish: more than 520 views.
https://www.youtube.com/watch?v=C-pKTnOLTyQ&list=PLRQChI0vpMP7NKYbImJXsvNtIF-C_tj-l&index=3

·· Open to other languages.