

# “La Nuit des ondes gravitationnelles”: a multi-site outreach event about gravitational waves

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On behalf of the **Event Organizing Team** (see next slide),

#NuitDesOG

La nuit des ondes gravitationnelles

20 mars 2017

Une soirée festive  
A partir de 18h, dans douze villes de France et en Italie.  
Conférences scientifiques, quiz, table ronde et visite virtuelle.

Des concours ouverts à tous  
jusqu'au 1er mars 2017  
<http://www.cnrs.fr/nuit-des-ondes-gravitationnelles/>

En partenariat avec

Paris  
Annecy  
Nice  
Lyon  
Marseille  
Lille  
Dunkerque  
Nancy  
Bordeaux  
Limoges  
Orléans  
Strasbourg  
Cascina (Italie)  
Florence (Italie)

Logos: CNRS, SF (Société Française de Physique), Ciel & Espace



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# Outline

- **Background**
  - LIGO-VIRGO first direct detections of gravitational waves
- **The project**
  - A live multi-site event organized on Monday March 20<sup>th</sup> 2017
  - Scientific and artistic contests
- **The party**
  - Local events
  - Global live (and interactive) evening
- **Influence**
- **Debriefing**
- **Outlook**

The poster features a dark blue background with a starry sky and a central graphic of concentric circles representing gravitational waves. The title 'La nuit des ondes gravitationnelles' is written in large, white, sans-serif font. A yellow banner at the top left contains the hashtag '#NuitDesOG'. A yellow banner in the center reads '20 mars 2017'. A list of cities is on the right: Paris, Annecy, Nice, Lyon, Marseille, Lille, Dunkerque, Nancy, Bordeaux, Limoges, Orléans, Strasbourg, Cascina (Italie), and Florence (Italie). At the bottom, there are sections for 'Des concours ouverts à tous' (with a deadline of March 1, 2017) and 'Une soirée festive' (held at the Grand Rex in Paris and other cities). The website URL 'http://www.cnrs.fr/nuit-des-ondes-gravitationnelles/' is at the bottom right.

#NuitDesOG

Paris  
Annecy  
Nice  
Lyon  
Marseille  
Lille  
Dunkerque  
Nancy  
Bordeaux  
Limoges  
Orléans  
Strasbourg  
Cascina (Italie)  
Florence (Italie)

La nuit  
des  
ondes  
gravita-  
tionnelles

20 mars 2017

Des concours ouverts à tous  
Date limite de dépôt des dossiers le 1er mars 2017  
Inscription préalable obligatoire sur le site

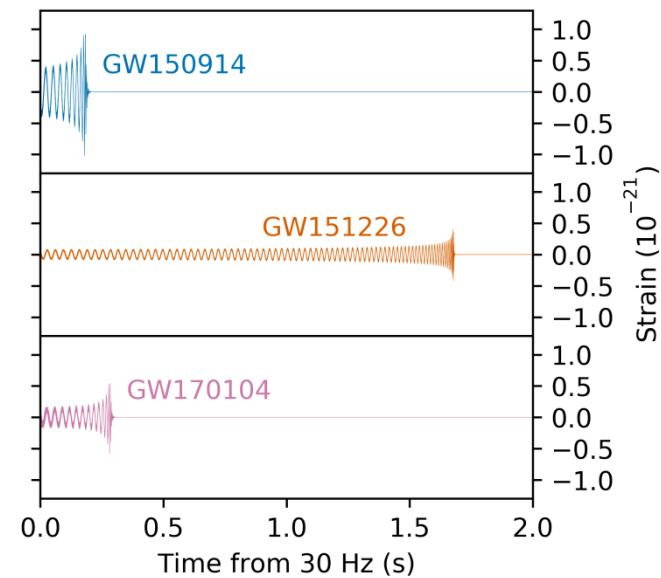
Une soirée festive  
Le 20 mars 2017, au grand Rex à Paris et dans de nombreuses villes  
(liste des villes disponibles sur le site)

<http://www.cnrs.fr/nuit-des-ondes-gravitationnelles/>



# Background

- **First 2 direct detections of gravitational waves**
  - **GW150914 & GW151226**
  - 3 events as of today (3<sup>rd</sup>: **GW170104**),
- **Stellar mass black hole binary coalescences**
- **Signals recorded by the two Advanced LIGO detectors**
  - **Hanford, Washington State**
  - **Livingston, Louisiana**
- **Data analyzed and published by**
  - **the LIGO Scientific Collaboration** and
  - **the VIRGO Collaboration**
- **For more information** about these discoveries
  - See yesterday afternoon's dedicated parallel session:  
<https://indico.cern.ch/event/466934/sessions/216415/#20170707>
  - Attend Michele Punturo's plenary talk on Monday afternoon  
<https://indico.cern.ch/event/466934/contributions/2473895>



# The project: a global multi-thematic event

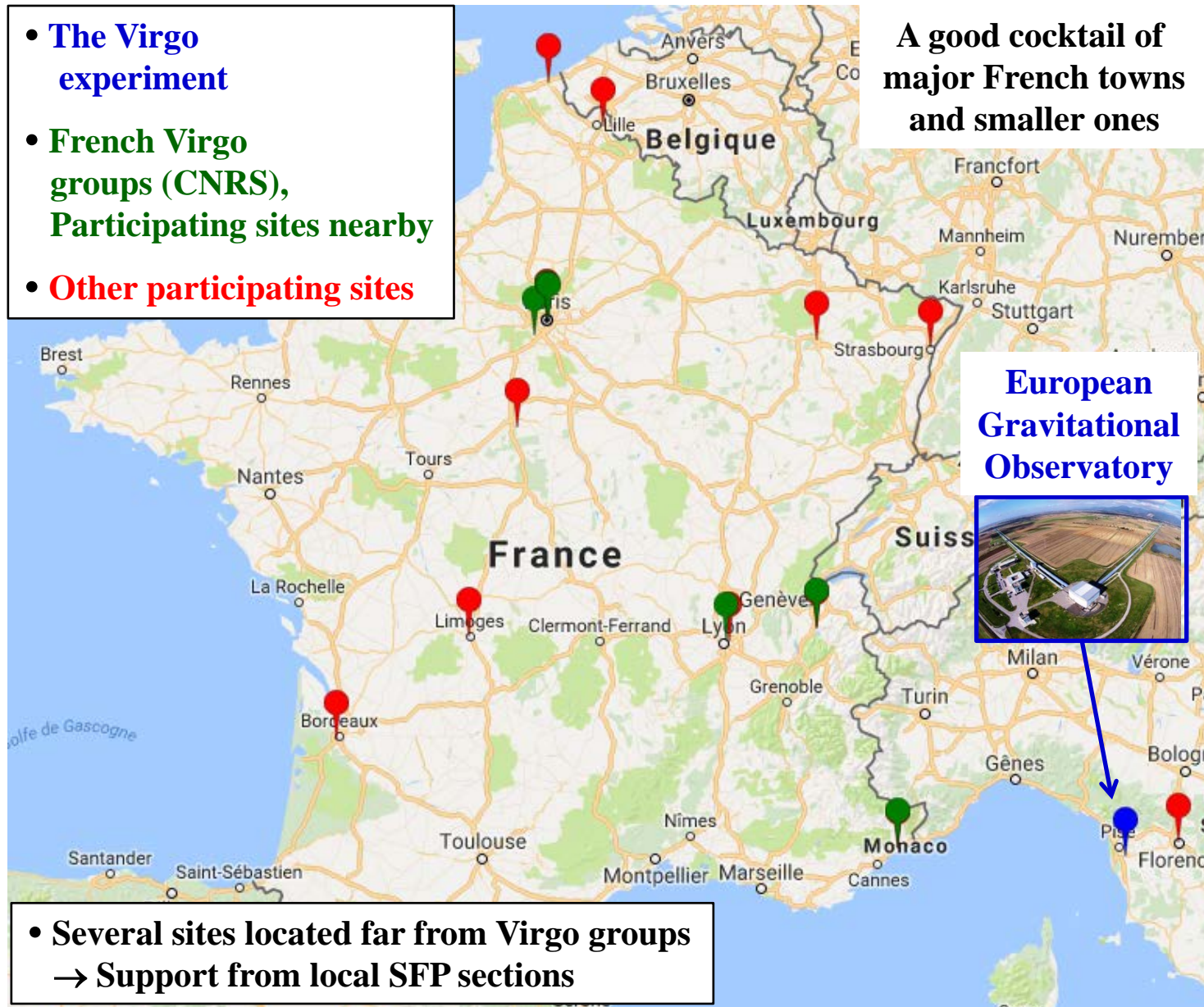
- The **Night of the Gravitational Waves**
  - **Monday March 20<sup>th</sup>, 2017**
  - Gravitational wave detection anniversary
- A joint initiative (in **French**), of the **CNRS** and of the **SFP** (French Physical Society),
  - Support from **VIRGO** and **EGO** (Virgo site),
- A **free public event**
  - An evening rather than a night
    - **From 18:00 to 22:30**
  - **Simultaneously in a dozen locations**
    - In **France** and **Italy**
    - Sites participating on a voluntary basis
  - Sites interconnected during part of the event
- A project with an educational part
  - **4 contests open to schools and to the general audience**
- Website: <http://www.cnrs.fr/nuit-des-ondes-gravitationnelles>



# Participating sites

- **The Virgo experiment**
- **French Virgo groups (CNRS), Participating sites nearby**
- **Other participating sites**

**A good cocktail of major French towns and smaller ones**

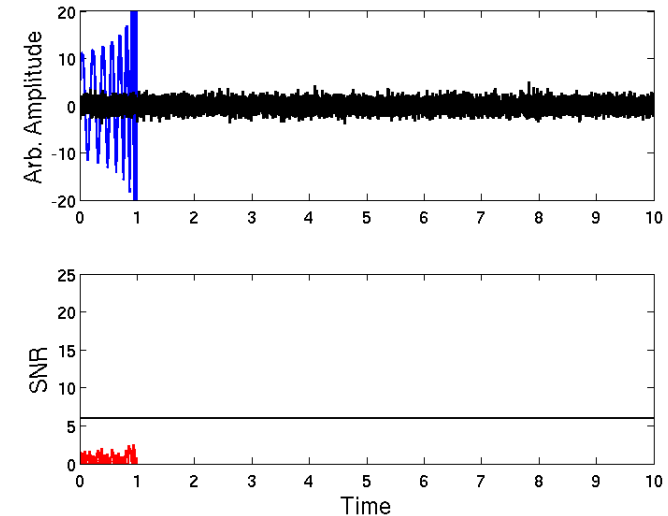


# Organization & planning

- **CNRS & SFP co-organization**
  - Very good match between central CNRS team and SFP local antennas
  - Technical support from the CNRS core communication team
    - ◆ Proposal selected at the national level
    - Website, communication plan, media contacts and social network diffusion
- A light central structure and **dedicated local teams**
  - About 10 months of preparatory work
  - Each local team free to design its event to match its goals and resources
- **Total budget: about 70 k€**
  - Small central budget (~25 k€), from the main research institutes
  - Auto-financing of all local events – universities, clusters, etc.
- **Live webcast**
  - Through the RENATER network and the CNRS/IN2P3 computing center
- Several technical meetings to prepare the live connection
  - **Identified since the beginning as the trickiest / less deterministic part of the event**
    - Central technical coordination
  - Connection quality tested first site-by-site, then globally

# Contests

- All open to the general audience and to students
  - Schoolchildren included!
- Two science-oriented contests
  - Data analysis: how to detect signals buried in noise
    - Chirp signals span the audible frequency band:
      - ◆ convert them into sound,
      - ◆ mix them with (acoustic), noise,
      - ◆ varying their signal-to-noise ratios
  - Experimental work: design some setup to generate/study (quadrupolar), waves
    - Gravitational waves are way too weak:  
use analogies
- Two more artistic ones
  - Write a short story or draw a comics
  - Send images including a picture shot with the [Pocket Black Hole app](#)



<https://www.laserlabs.org>

AndreasFreise





# Event schedule

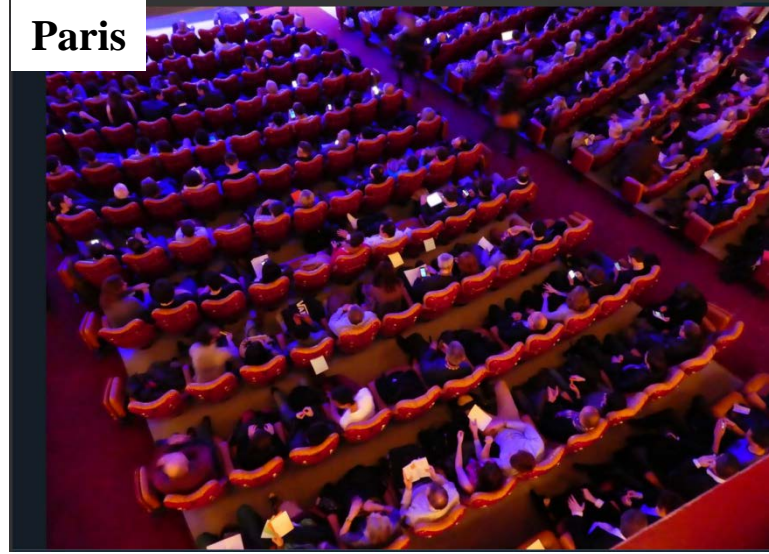
- A mix between local events and live sessions
- **Schedule common to all sites**
  - 18:00: Door opening
  - 18:30: Local conference about gravitational waves
  - Short break
  - 20:00: Presenter on the « Grand Rex » stage (main site), starts hosting the event  
→ Florence Porcel: science communicator on YouTube, Twitter, radio/TV, etc.
  - 20:15: Live connection with the Virgo control room
  - 20:30: **Interactive quiz**  
→ Sites compete against one another!
  - 21:00: Broadcast of a **short movie** about the laboratory (LMA, near Lyon), which is « coating » the Virgo mirrors
  - 21:15: **Debate about science and cinema**  
→ Broadcasted live from the « Grand Rex »
  - 22:30: Ending



# The « Nuit » in short

- All local sites happy to have participated to the event
- Auditorium occupancy  $\geq 75\%$  for all sites
  - Close to 100% in Paris!
    - The « Grand Rex » has 2,700 seats (largest theater in Europe),
  - A mix of large and smaller rooms selected by local organizers
  - Most of the audience stayed until the end
  - Excellent atmosphere everywhere
  - About 5,000 spectators in total at sites
- Young audience as well
  - For instance: 850 students from 40 classes in the Paris area
    - E-mailing campaign based on existing high-school teacher mailing lists gathered during other outreach & educational projects (mostly CNRS/IN2P3),
  - Week of 03/20 was one of the few in the February-April range during which there was not any school holiday in France...
    - Twice 2-week holidays (Winter and Spring),; France divided into 3 zones

Paris



Vaulx-en-Velin (near Lyon),

# Social network coverage

- Media used to ask questions live
- **Twitter** + Periscope
  - Hashtag [#NuitDesOG](#)
    - 684 tweets + 1896 retweets:  
7 Mpeople « reached »
    - **Second topic discussed that evening**
      - ◆ Debate for the presidential election on TV
- Live on CNRS **Facebook** page
  - <https://www.facebook.com/cnrs.fr/videos/1475770485779895>
  - 30,000 connections during event
    - Reach: 130,000 people
    - Within the top audiences for the page
  - **Replay: 38 kViews**
- **CC-IN2P3 webcast** to watch the Paris event live from remote
  - 300+ connections continuously over the evening

## Good deal advertisement

⚡⚡⚡ Gagnez un Bon d'achat de 500€ chez [redacted] !!!  
[bit.ly/2fll85u](#)

**#LRDS #journeedubonheur #LFODG #nuitdesOG** Monica Bellucci

Donnez votre avis et tentez de recevoir **GRATUITEMENT 500€** à dépenser dans votre magasin

**Je participe**

19:19 - 20 mars 2017

Twitted on 2017/03/20 at 19:19 LT

Les signaux détectés

Suivez en direct la Nuit des ondes gravitationnelles d...  
Publié par CNRS  
38 058 vues

Webcos IN2P3/CNRS

# What worked (very), well

Strasbourg



- No security problem of any kind
- A **centralized registration system**
  - Based on « [Evenium](#) » and managed by CNRS
  - Each site could open a given number of seats and follow their occupancy rate

- A **mix of big and medium cities**

- The **quiz**: fun and convivial!

- 7 questions, 4 answers each
- Funny / More serious

→ Drawn on the  
Masterclass' quiz

- **Majority rule** locally,  
based on **color cards** shown by the audience

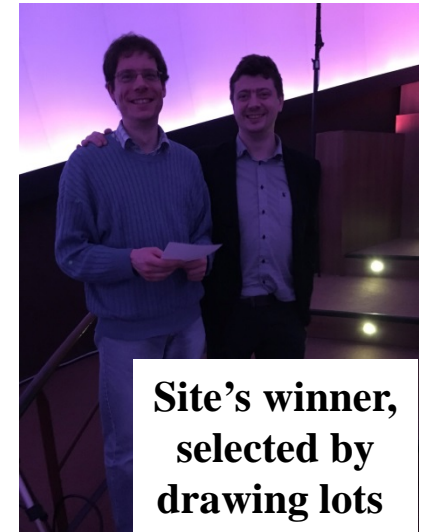
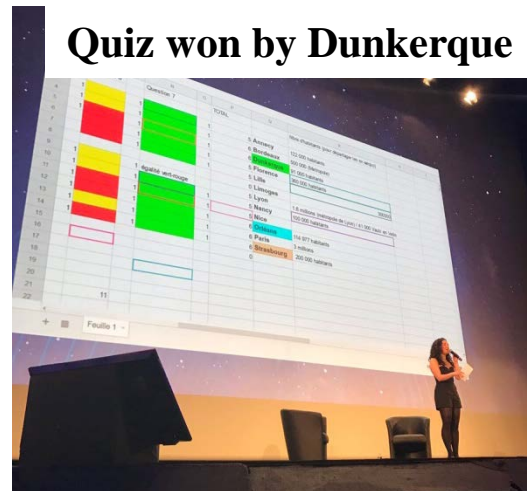
- **Quiz well-timed** – short reflection time; then, time to debrief each question

- **Online spreadsheet** to send/share the results

- In case of equally-ranked site, the city with the smallest number of inhabitants wins

- **Winner found among the audience of the winning site by drawing lots**

→ Prize: **a trip for two to visit the site of the Virgo experiment**



# What did not work...but definitely should have!

- **The H323 videoconference link between the participating sites**
  - Technical problem somewhere on the RENATER network
    - Not identified during the live event – nor afterwards in fact



- **Live feed from the Virgo control room could not happen**
  - Backup: a 6-minute CNRS movie about the first gravitational wave detection
- **Then switch to plan B**
  - Paris feed broadcasted everywhere for the quiz
  - Then all sites were asked to switch from RENATER to the webcast feed
    - ◆ Etherpad webpage setup for live / behind-the-scene exchanges between sites
  - Setup used until the end of the event – in particular for the science & cinema conf.
    - Good quality signal / No interaction possible anymore

# What may have worked better

- **The contests**

- Not many applications, especially for the scientific ones  
→ More replies for the non-scientific ones
  - ◆ But of unequal quality
- With more preparation time, could have defined contests which would have better matched the teacher expectations
- Some high-schools from quite remote locations participated

- **Limited media coverage**

- More coverage to announce the event than to relate what actually happened
- But two national public radios and some regional newspapers + partnership with the monthly « Ciel & Espace » magazine
- Article to be published soon in the SFP journal
- Pictures archived on CNRS photo libraries



# Lessons learned

« Sound interferometer »  
Vaulx-en-Velin



**Demonstrations @ LILLE**  
before the event start

- **Need a good topic**
  - Scientifically important
  - Easy to grasp for the general public
- **Implication and enthusiasm of the scientific community**
  - French Virgo groups + SFP local antennas
- **Find the appropriate mixture of science and fun**
  - E.g. improv theatre company + live performance from street artist @ Annecy
- **Sites out of campuses are always a plus** – « Aim big, think big »
  - Cost more but rewarding
- People can skip dinner for science
  - But providing snacks/drinks helps sustain attendance
- **Social media mandatory**  
to target young people / students
- **Contact high-school teachers**
  - Local & already alerted to our fields
  - Boost the audience by coming with their students
  - Need to have list of contacts beforehand

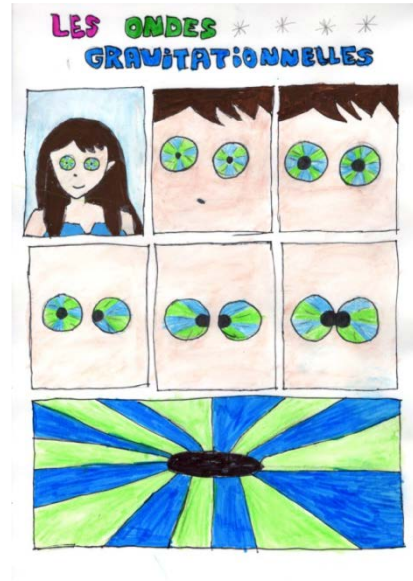
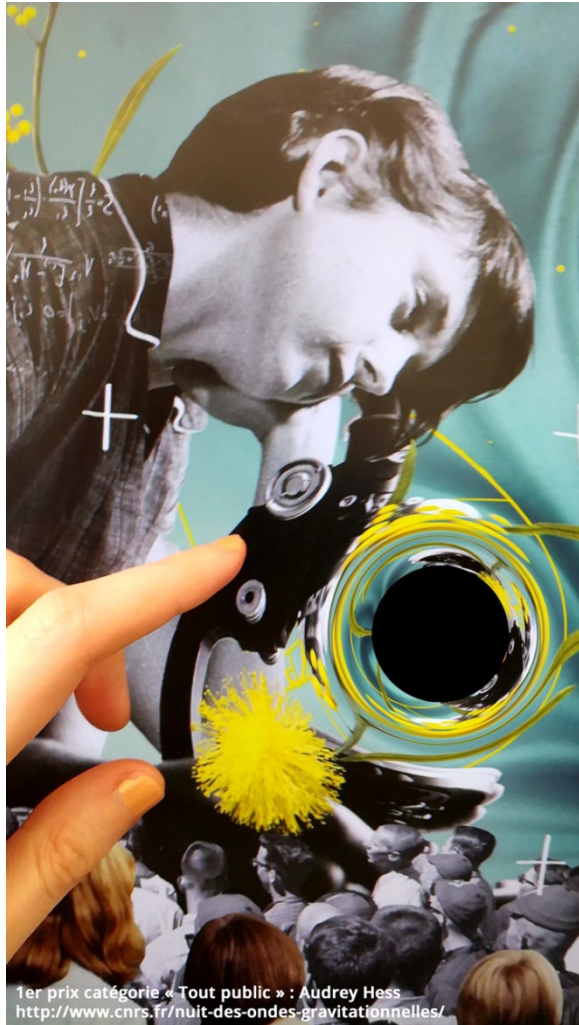


# What next?

- **Resources developed to be reused** for two future (not-too-distant!?), event
  - A possible **Nobel prize**
  - A **first gravitational wave detection** partly based on Virgo data
- **« Nuit of something »-like events organized regularly in France since 2010**
  - First was for the ICHEP conference in Paris
- Hopefully **more to come in the coming years**
  - With **varying intensity and effort**
  - **Based on science news**
- **One possible path to explore: illustrate every year the Nobel prizes in physics**
- **Extensions to other countries welcome**
  - One Italian site (Florence), participated to the « **Nuit des Ondes Gravitationnelles** »
  - Workarounds to be found to overcome the language barrier



# Some of the contest winners



Autre signal détecté  
(GW9 ?)

