



REINFORCE

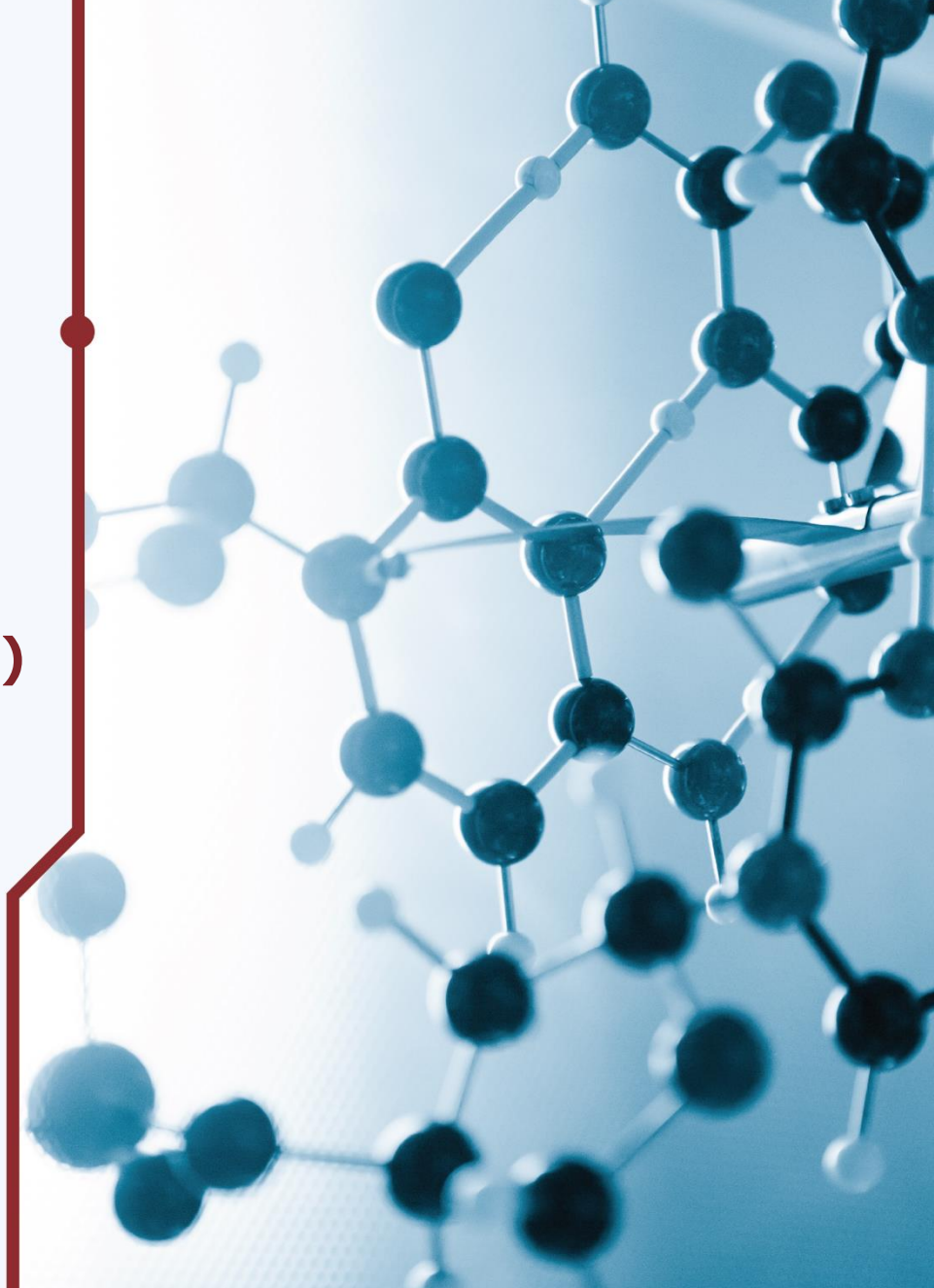
REsearch INfrastructures FOR Citizens in Europe

REINFORCE






**(Research Infrastructures FOR Citizens in Europe)
1 December 2019 – 1 December 2022**

S. Katsanevas

EGO Director

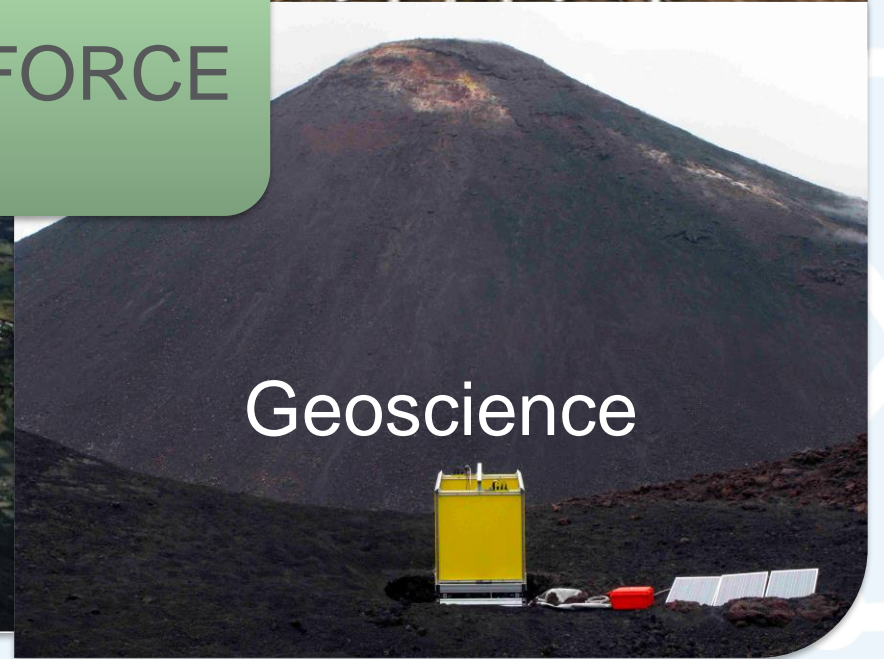
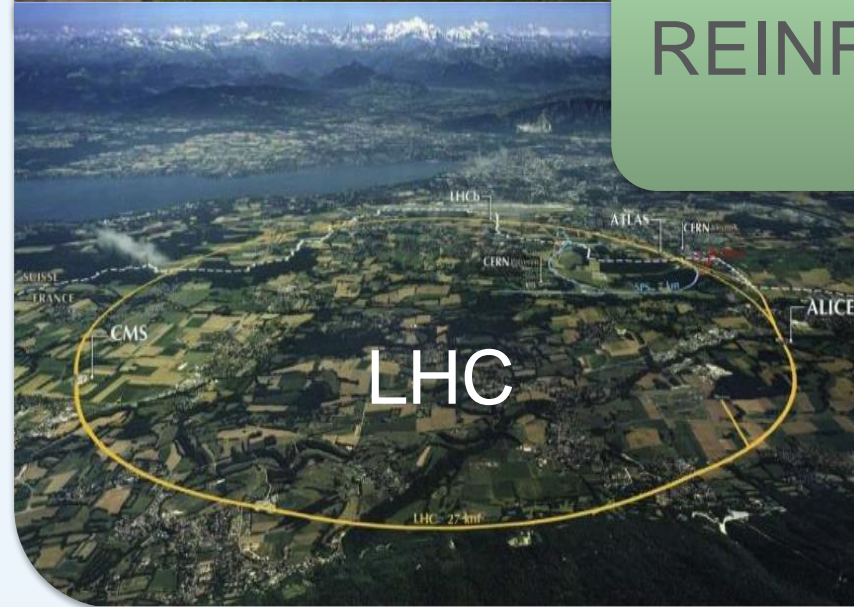
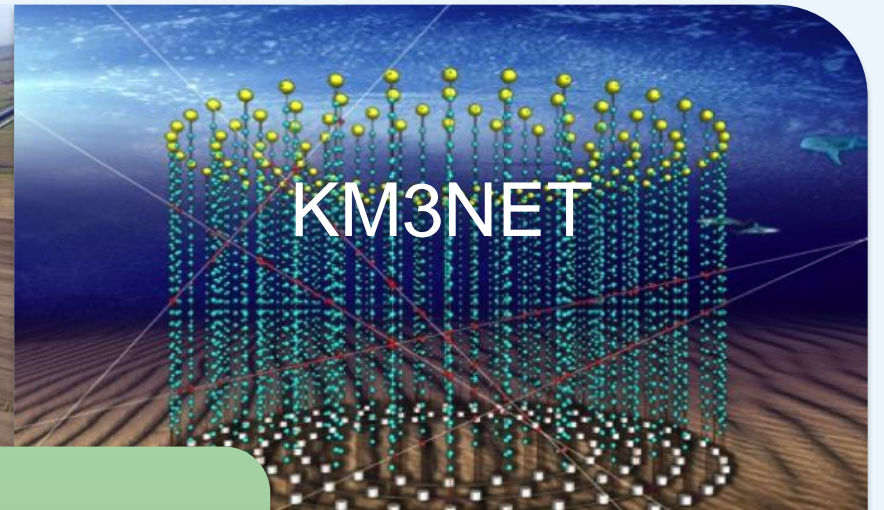


The Goals

-  *To develop new knowledge in Science with the support of citizens, effectively engaging them in the process (a two way process)*
-  *To develop a multi-sensorial apprehension of the cosmos (Universe, Earth, Society and Human)*
-  *Explore the potential of frontier citizen science for inclusion and diversity; Beyond students and educations and general citizens to e.g. visually impaired, confined, seniors*
-  *To go beyond established traditional disciplinary frontiers of the modes of apprehension of reality, exploring the interface between Art and Science*
-  *To develop critical thinking in a world moving towards increased digital connectivity and remote employment (post covid-19)*



The Infrastructures



REINFORCE

The era of Gravitational Waves

● A new window on the Universe

- Study gravitational fields and mass distribution in cosmic sources
- Probing black holes and other “dark” astrophysical sources
- Test general relativity against other theories on gravitation
- Investigate Big Bang cosmology (primordial gravitational waves)

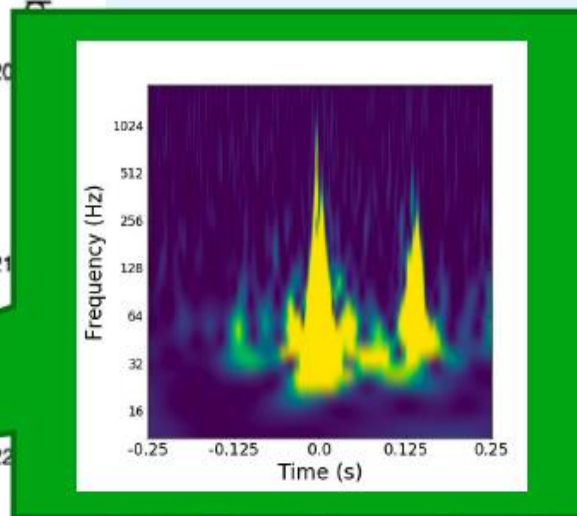
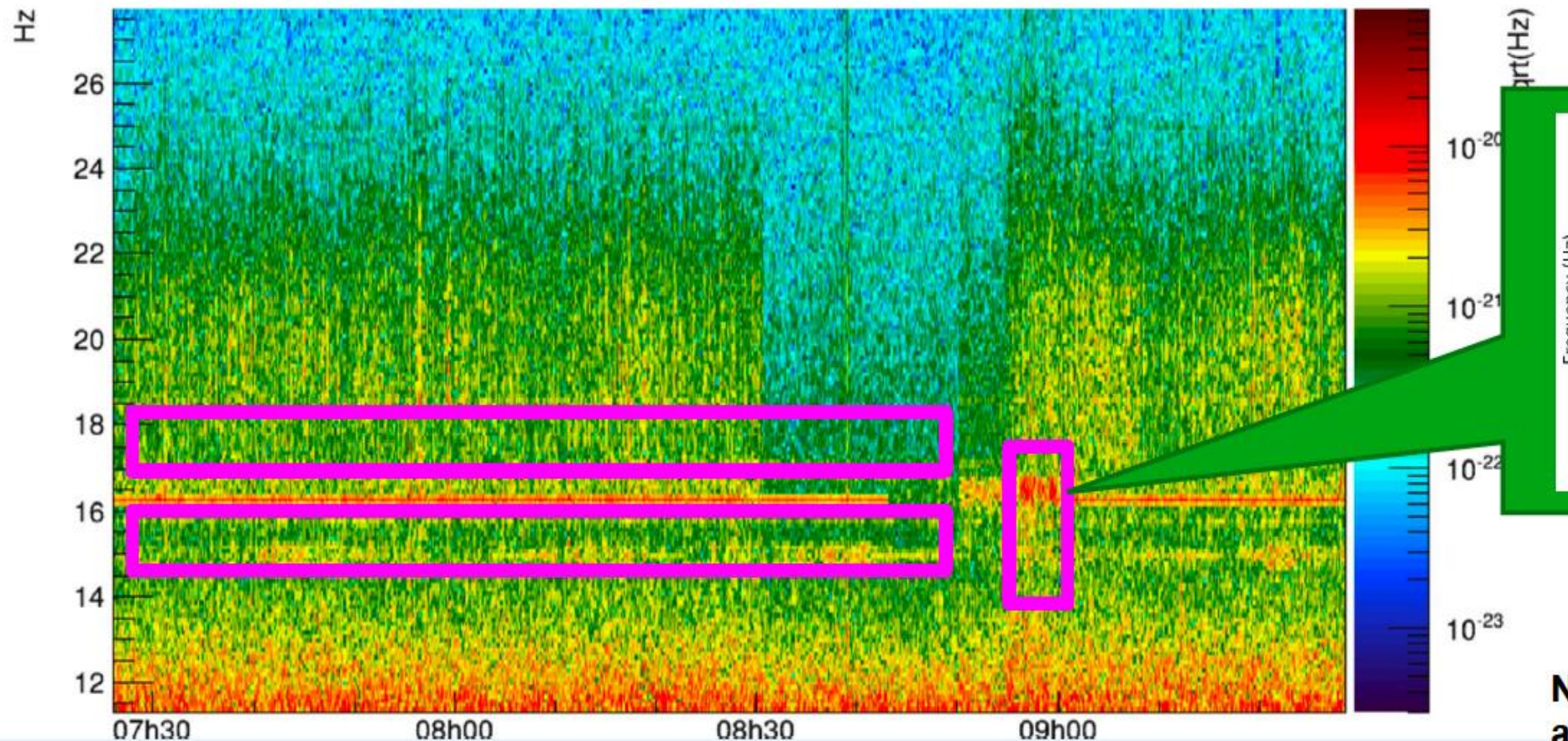
● Multimessenger Astrophysics

- Gravitational waves carry complementary information with respect of light
(traditional astronomical “messenger”)

Signal detection: 10 Hz-10 kHz → “Acoustic”



Investigating the noise



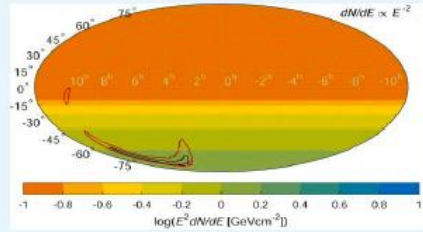
Example of “zoom”
on a glitch

**Not just visual:
also audio representation
will be used**

From Virgo logbook

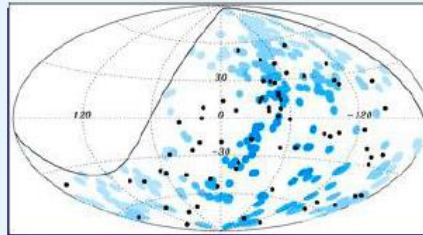
Multi-messenger Astronomy → Neutrinos

Gravitational Waves



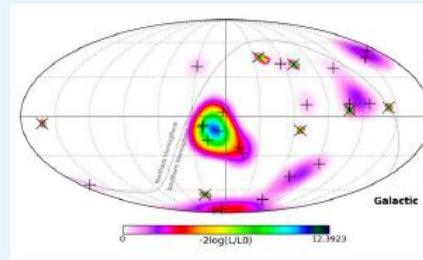
VIRGO,
LIGO

Cosmic Rays



AUGER,
EUSO

Neutrinos



Deep Sea Hunters

Bioluminescent organisms:
Optical Signals



Ceteceans:
Acoustic Signals





Muography

Muography = μ -ray imaging technique : absorption / scattering \rightarrow sensitive to ρ (opacity)

Geosciences



- Volcanology
- Geology
- Hydrology
- Atmosphere physics
- CR physics
- ...



Archaeology



- Tumulus
- Anthropic structures
- Ruins
- ...



Industrial controls



- Non invasive controls
- Nuclear cycle production
- Civil engineering
- Tunnel boring machines
- Prospection & mining
- ...

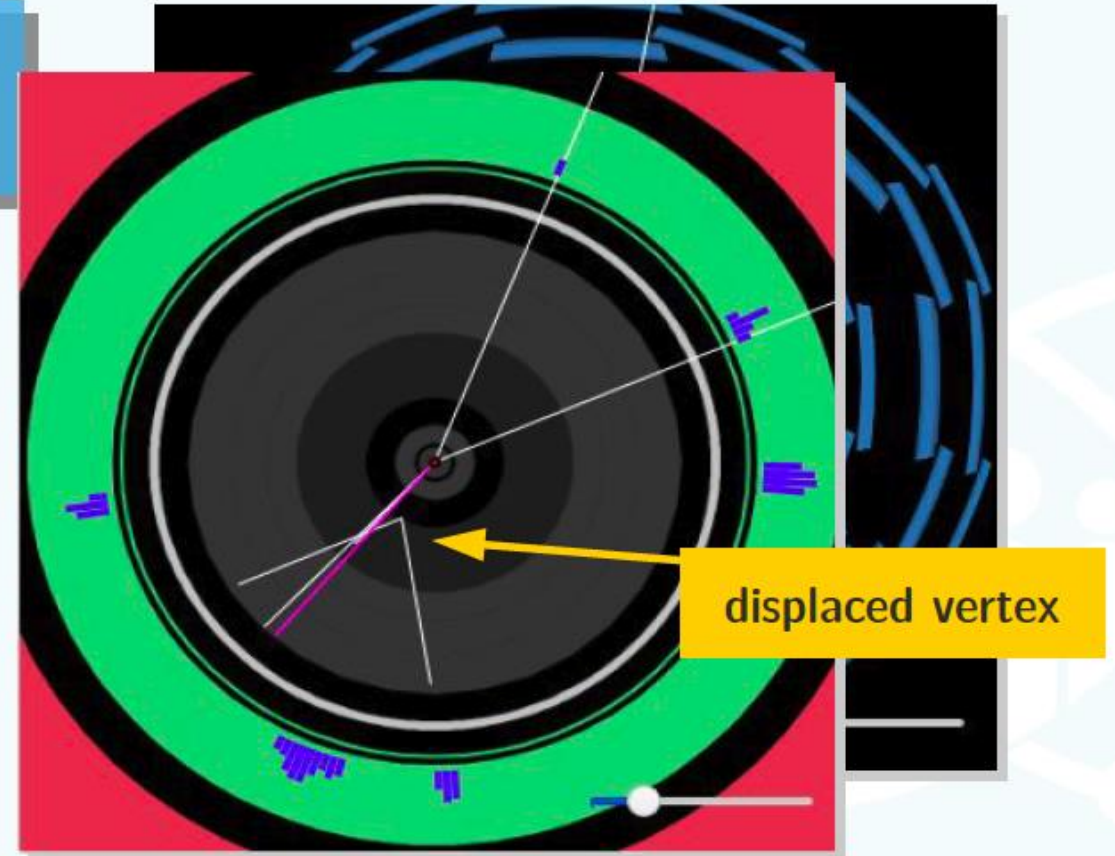


Technological transfer





Relate the 2 infinities → NEW PARTICLES AT THE LHC

1. Learn about the different kinds of particles and identify them among collision products.





2. Learn to identify traces of new physics.

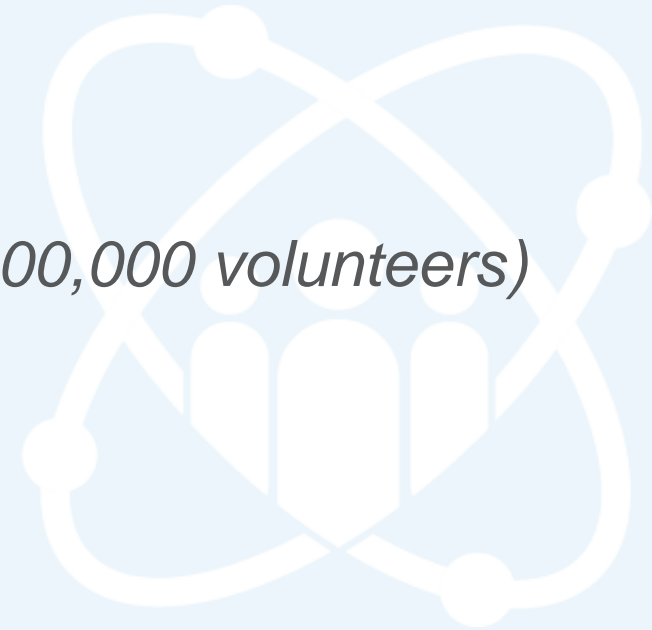


The methodology

-  *Engage society in frontier research*
-  *Develop Large Scale Citizen Science Demonstrators*
-  *Implement a participatory engagement design*
-  *Develop a Policy Roadmap*

The tools

-  *Use Zooniverse (Citizen Science Platform with more than 1,000,000 volunteers)*
 -  www.zooniverse.org
-  *New sonification software (SonoUno)*
 -  <https://pypi.org/project/sonoUno/>






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REsearch INfrastructures FOR Citizens in Europe

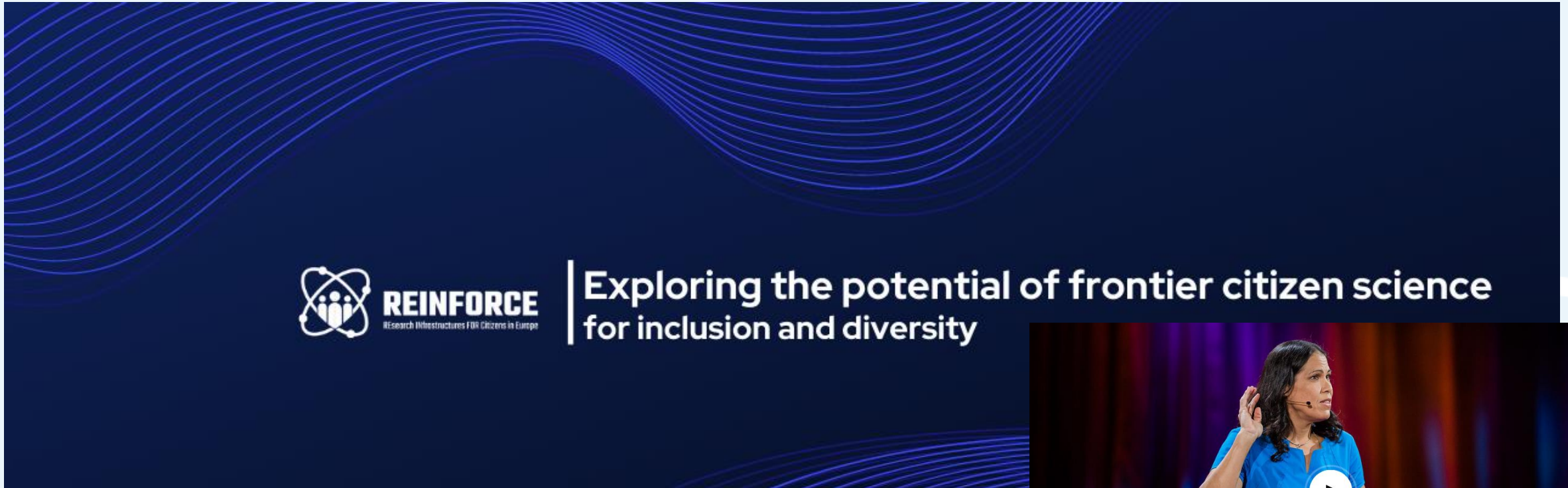
Using Zooniverse (Citizen Science Platform with more than 1,000,000 volunteers) to host the REINFORCE Demonstrators (www.zooniverse.org)

ZOONIVERSE

Zooniverse is known as the world's largest platform for online citizen science, allowing researchers across Europe and beyond to build and run their own projects without requiring software development expertise, at the same time giving participants the chance to focus on skills development, playing a full role in scientific exploration.

REINFORCE is built on the Zooniverse platform 

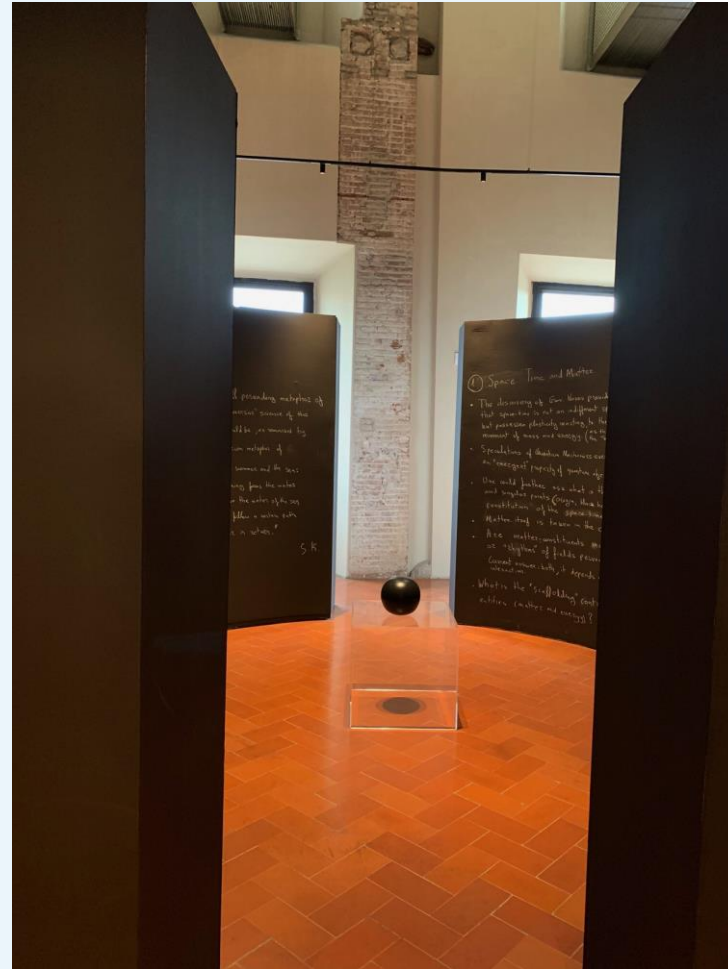
INCREASING THE SENSES INCREASING INCUSION



Not only increasing inclusion
Also increasing the researchers discrimination power of signal over
background by using sound.



https://www.ted.com/talks/wanda_diaz_merced_how_a_blind_astronomer_found_a_way_to_hear_the_stars?referrer=playlist-ted_deep_cuts_vol_2&language=en



Riflessione:
Nucleo sferico, globo, forma.
Nero. Terra notturna illuminata dalla luna.
Abisso.
Pieno o vuoto...
...liscio!
Mistero esoterico.
Ragione. Emozione.
Inquietudine. Oppressione.
...freddo!
Pupilla di Polifemo.

Una poesia di: **Silvana-Antonino-Silverio-Laura-Leonardo-Francesco-Anna-Giulia-Joyce.**

Réflexion:
Noyau sphérique, globe, forme.
Noir. Terre de nuit illuminée par la lune.
Abysses.
Plein ou vide ...
... lisse!
Mystère ésotérique.
Raison. Emotion.
Inquiétude. Oppression.
... froid!
Pupille de Polyphème.

Odissea nello Spazio

Reflection:
Spherical core, globe, shape.
Black. Earth at night illuminated by the moon.
Abyss.
Full or empty ...
... Polished!
Esoteric mystery.
Reason. Emotion.
Restlessness, Oppression.
... cold!
Pupil of Polyphemus.

<https://sites.ego-gw.eu/ilritmodellospazio/>



Critical Thinking

Sense and Sensibility and Science

A UC Berkeley Big Ideas Course

[HOME](#)

[SYLLABUS](#)

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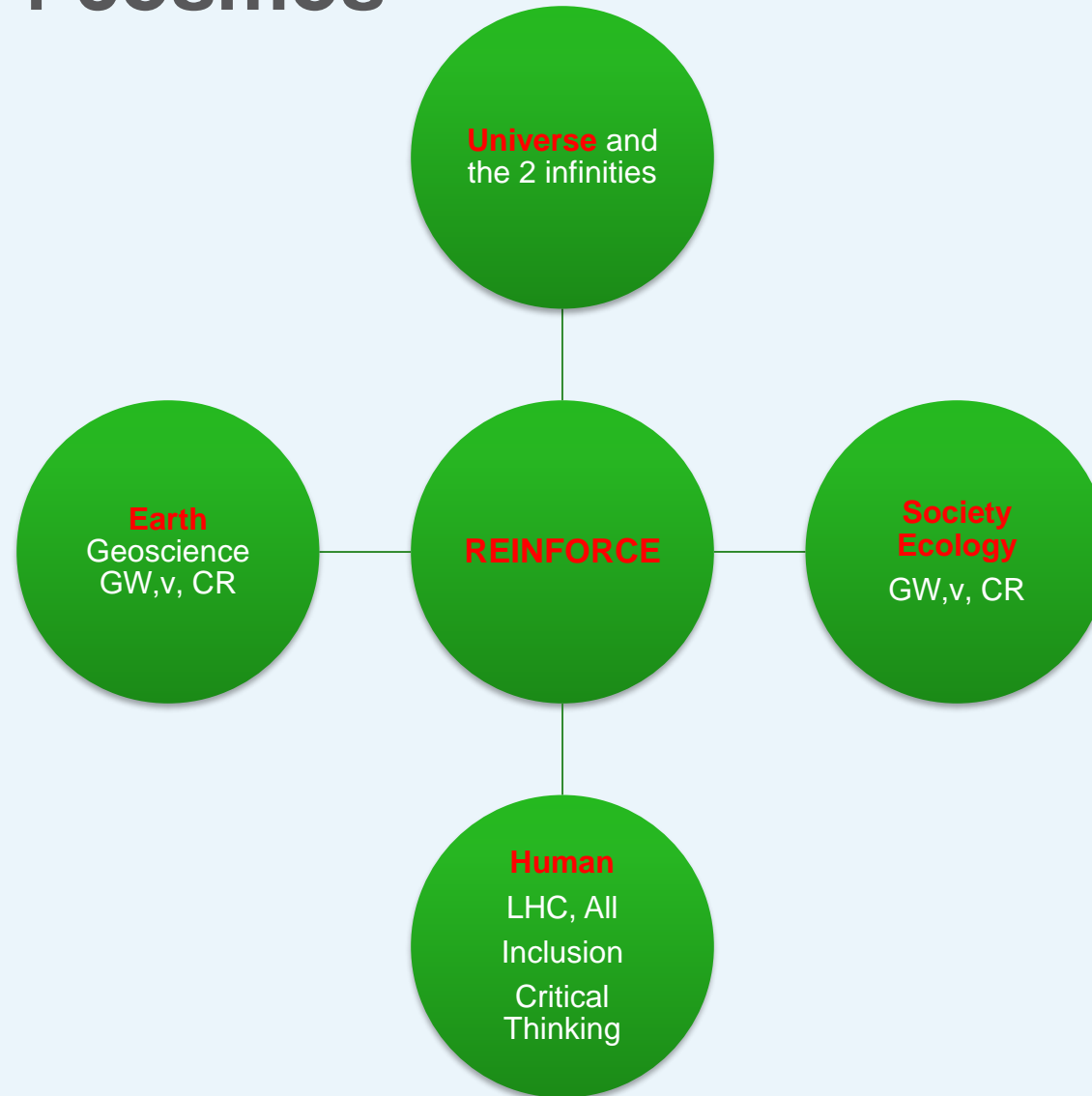


Interdisciplinary problem solving

Sense and Sensibility and Science is a course which teaches interdisciplinary problem-solving

<http://sensesensibilityscience.com/>







The 4 cosmos



The Partners

#	Participant Legal Name	Country	Action
1	EUROPEAN GRAVITATIONAL OBSERVATORY(EGO) (OSSERVATORIO GRAVITAZIO NALEEUROPEO)	IT	
2	ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE	EL	
3	INSTITUTE OF ACCELERATING SYSTEMS AND APPLICATIONS	EL	
4	CONSEJO NACIONAL DE INVESTIGACIONES CIENTIFICAS Y TECNICAS (CONICET)	AR	
5	THE OPEN UNIVERSITY	UK	
6	ZENTRUM FUR SOZIALE INNOVATION GMBH	AT	
7	The Lisbon Council for Economic Competitiveness and Social Renewal asbl	BE	
8	UNIVERSITA DI PISA	IT	
9	TRUST-IT SRL	IT	
10	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	FR	
11	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD	United Kingdom	

In conclusion, REINFORCE

-  *Perceives citizen's science as a participatory process, an amalgam of "contributory" and "co-created" citizen science, in which citizens are trained in frontier science in constant connection with researchers through their communities of practice, they provide their feedback, they voice their concerns and they explore the boundaries of knowledge.*
-  *will explore multi-modal apprehensions of reality (image, sound,...) forge interdisciplinary connections and support critical thinking*
-  *will engage citizens from different target groups and develop a dedicated framework for each of them throughout its lifetime.*
 -  *Students and educators in secondary education.*
 -  *Citizens with visual impairments.*
 -  *Confined and older citizens.*