



BLIND INJECTIONS

Giacomo Raffaelli

When in 1916 Albert Einstein formulated the theory of General Relativity, only one part of his theory was not accepted by the scientific community: the existence of gravitational waves. Since then, no direct proof of such mysterious phenomenon has been found.

Until the 11th of February 2016.
Thanks to the scientists of VIRGO.

This is how VIRGO looks from the outside

VIRGO is a giant laser antenna—namely an *interferometer*—that took part in what is considered the most important scientific discovery in decades. The observation of gravitational waves, announced to the world on the 11th of February 2016, has been made possible through the collaboration of 2 research centers: VIRGO in Italy and LIGO in the US.

this is the view
at ground level





this is the inside

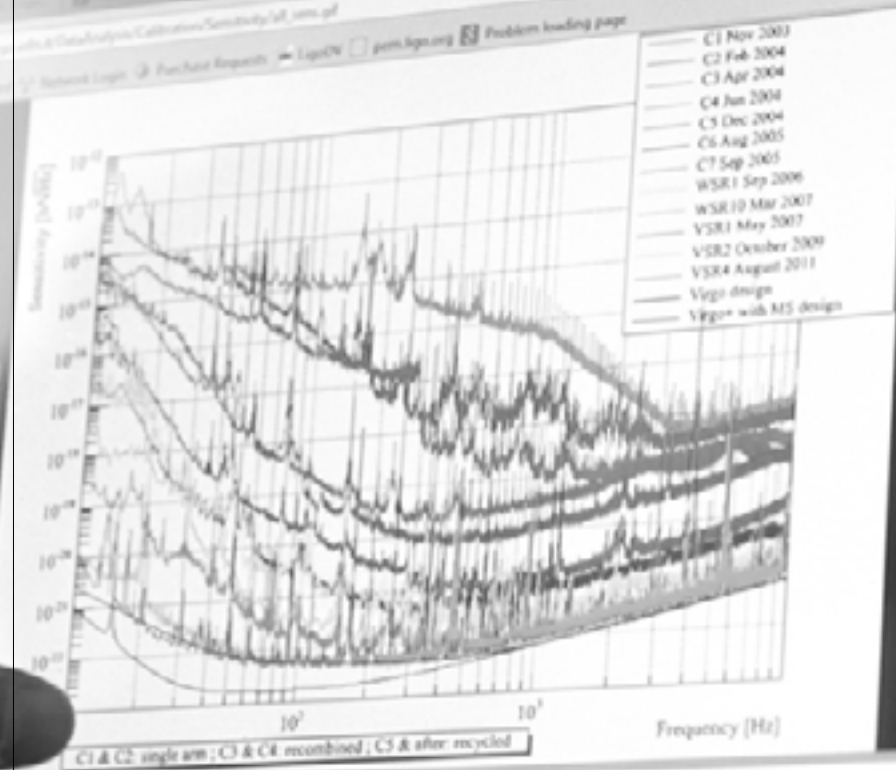


and the deeper inside.



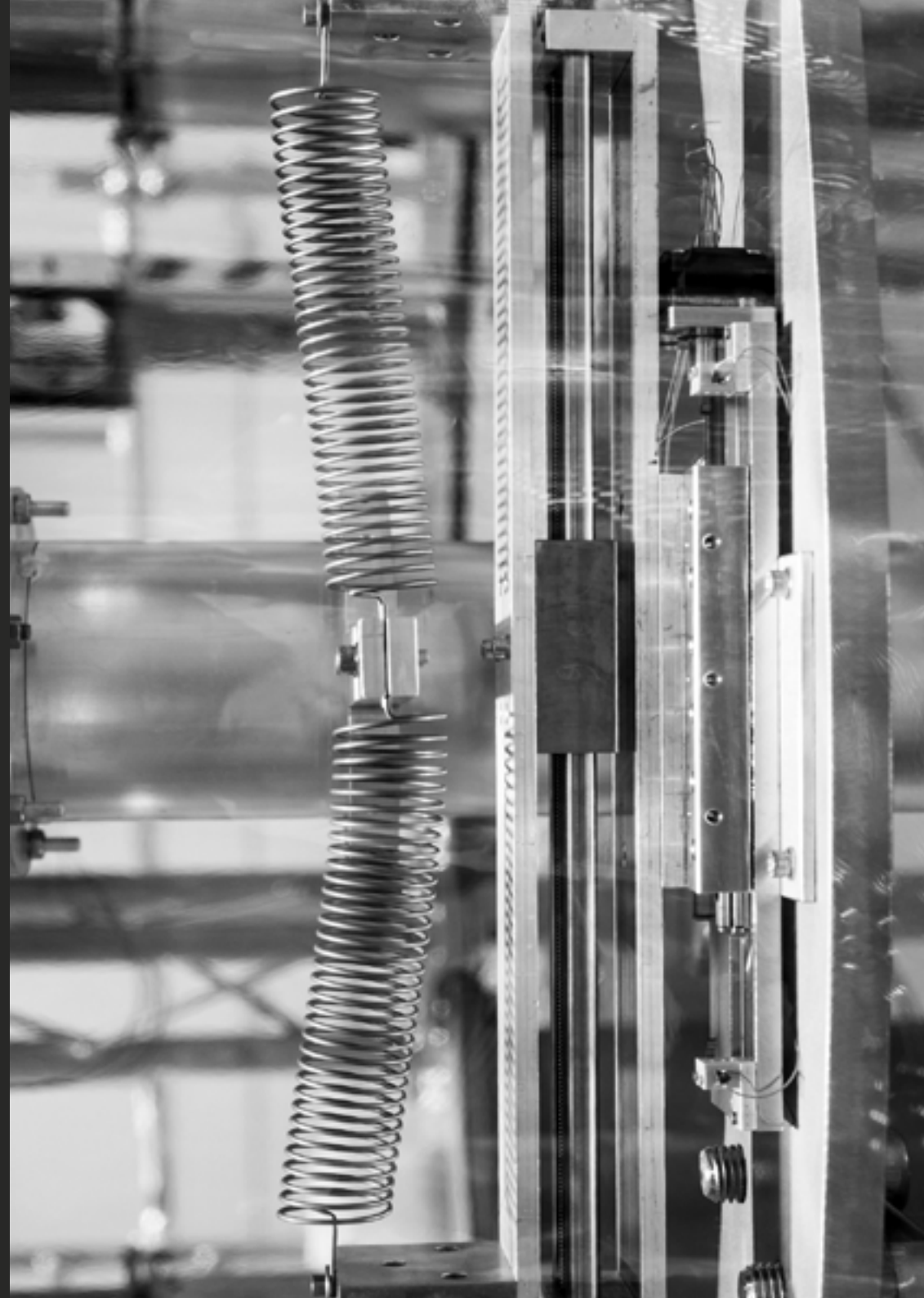
**During summer 2015
I spent three months
at VIRGO, following
the work of researchers
building the physical
apparatus of the
experiment.**

**I realized that VIRGO
is unique for how it
explores the universe
within a frequency
range that corresponds
precisely with the one of
the human ear.**



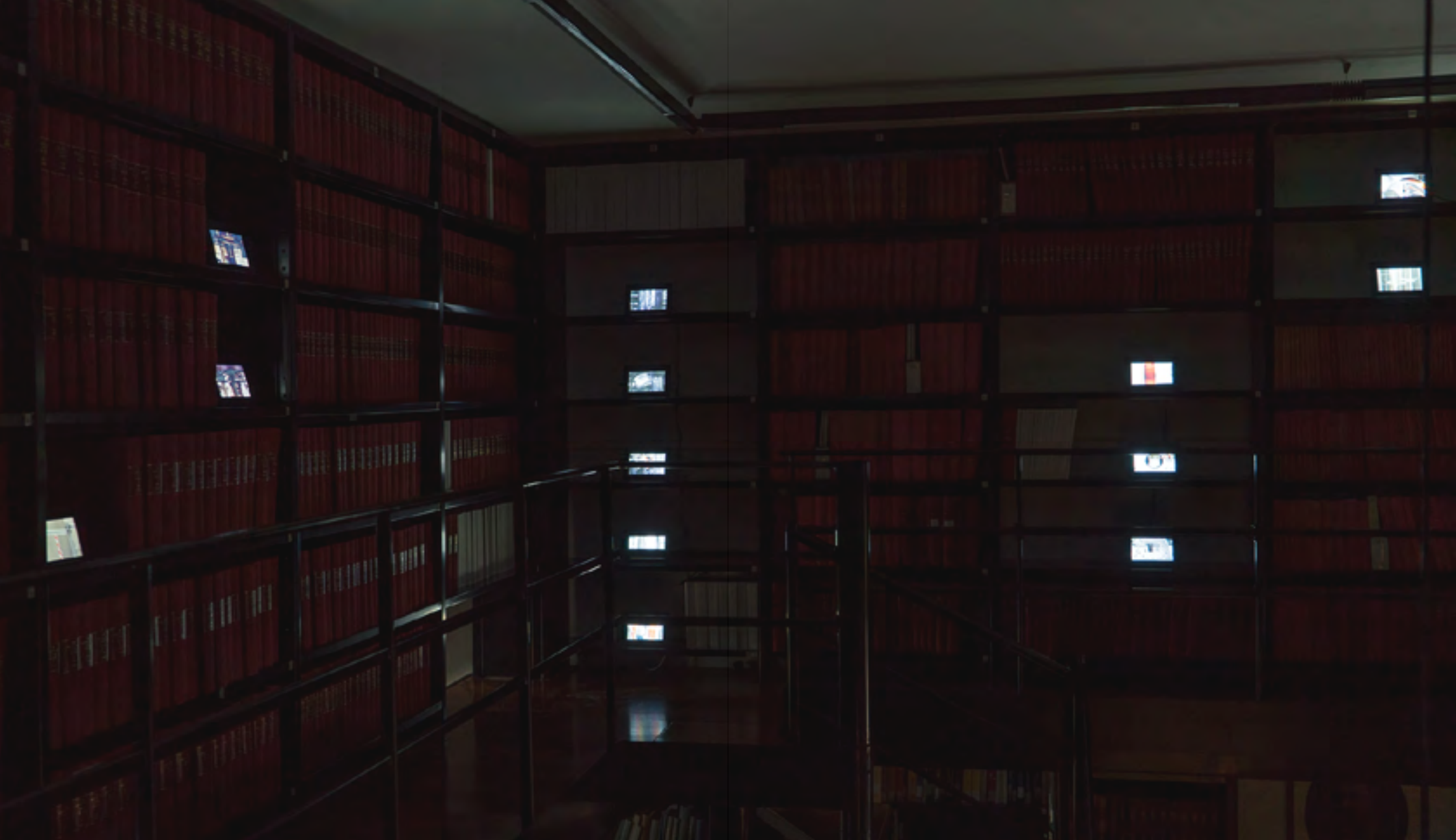
INFN researcher Irene Fiori shows the sensitivity curves of the antenna, which operates between 10 Hz and 10 kHz. Such characteristic makes the working spectrum of the device entirely audible, leading researchers at VIRGO to use listening as a powerful means to detect issues and disturbances to the device.

VIRGO is basically an observatory where the universe can be heard rather than observed.





The intrinsic correlation between the study of gravitational waves and sound has been the subject of *Blind Injections*, a site-specific installation for the library of the Arcetri Astrophysical Observatory in Florence (IT).



Blind Injections, 2015

installation view at Arcetri Astrophysical Observatory, Florence (IT)

30 videos on 30 digital frames, quadriphonic sound

23'00''

Blind Injections explored the archive of sounds produced by VIRGO throughout the last decade of experimentations. Particularly, the installation was based on those sounds used by researchers to identify and resolve external disturbances to the antenna.



Blind Injections, 2015
installation view at Arcetri Astrophysical Observatory, Florence (IT)

30 videos on 30 digital frames, quadriphonic sound
23'00''

Such *diagnostic sound archive* was orchestrated into a quadriphonic composition, synced with 30 videos running on small lcd screens displayed among books on the library shelves.

The discoveries made during the research at VIRGO pushed me to look further into sound as a tool for astronomy. At the very roots of such relationship is the peculiar story of Karl Jansky.





Jansky is an audiodrama on the story of Karl Jansky, an American physicist who unconsciously became a pioneer in radio astronomy. The work is based on a reading of "*L'universo violento della radioastronomia*" by Italian astrophysicist Margherita Hack, with the insertion of sounds sourced from the archives of the Arcetri Astrophysical Observatory in Florence.

Jansky, 2015

presentation of the audiodrama at Helicotrema - Recorded Audio Festival, Punta della Dogana, Venezia

stereo sound
8' 36"

Jansky set the premises for
a further exploration of the
notion of discovery, in its social
and political implications



In the short film-essay *Gravity's Ghost I* investigated the hidden socio-political conditions for the creation of the VIRGO interferometer, leading to the subsequent discovery of gravitational waves.



Departing from the study of a previous attempt to observe gravitational waves through a different type of antenna, the film reveals how the refusal of such experiment in favours of the more successful interferometers discloses interesting aspects of the political and economical structure of scientific communities.

The film takes its title from a book by British sociologist Harry Collins, whose research of the gravitational waves community has been an essential source of study for this part of the project.



Gravity's Ghost, 2016
stills from video

HD video, projection, color, stereo sound, 6' 04"
password: gravity2016



To expand upon such issues and to open them up to a broader audience I organized a public conversation involving professionals from the gravitational waves field. The talk problematized the role of science in the public arena, while complexifying its relations with the current status of expertise evaluation and policy making.

Qualcosa di turbolento (Something Turbulent), 2016
public conversation at Le Murate Progetti Arte Contemporanea, Firenze (IT)
with
Stefania Rispoli, art curator, Museo Novecento
Paolo Tozzi, senior researcher at Arcetri Astrophysical Observatory
Giovanni Losurdo, project leader VIRGO - European Gravitational Observatory

Departing from
such conversation a
performative lecture
has been produced.
The title refers to a quote
by Giovanni Losurdo:
“At the core of the
research on gravitational
waves is the realization
that the universe isn’t as
quiet as it seems; there’s
something turbulent there”.

Qualcosa di turbolento (Something Turbulent), 2016
performance view at Teatro del Cielo, Firenze (IT)


performance, video projection
55' 00"

While the construction of VIRGO was getting completed during 2016 I produced a new work focussing precisely on the experiment's operative architecture.





**A utopic challenge
is at the core of the
experiment: the
complete isolation
of the devices from
the vibrations of the
Earth's crust.**




spreading out in space at the speed of light

**Combining text with
footage from VIRGO's
laboratories *Gravity's
Ghost and Big Dog*
explores the scientists'
attempt to protect the
experiment from the
planet itself.**

Gravity's Ghost and Big Dog, 2016
stills from video

HD video, color, stereo sound, 10' 27"
password: gravity 2016



everything you're seeing and hearing

The highly complex structure used to prevent vibrations from the Earth's crust are called "superattenuators". They were prototyped by Italian physicist Adalberto Giazotto and their correct set-up has been the most important condition for the success of the experiment and the observation of gravitational waves.

Gravity's Ghost and Big Dog, 2016
stills from video

HD video, color, stereo sound, 10' 27"
password: gravity 2016

Blind Injections will
continue in 2017 in
collaboration with
VIRGO and the
**European Gravitational
Observatory.**





The project will further attempt to produce a speculative reversal of VIRGO's function: from man-made device to observe the universe, to cosmic signal for an enquiry of the human.

Blind Injections

a project by **Giacomo Raffaelli**

produced by **SONIC SOMATIC**

co-produced by **INAF - Osservatorio Astrofisico di Arcetri**

within the **Estate Fiorentina 2015, Comune di Firenze**

with the kind support of **EGO & The VIRGO Collaboration**

during the artist residency at **Le Murate PAC, Firenze**

SONIC SOMATIC is a project curated by Trial Version
and International Feel

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