

Today's visit

Virgo/EGO visit, October 17th 2017

Nicolas Arnaud (narnaud@lal.in2p3.fr)

Laboratoire de l'Accélérateur Linéaire (CNRS/IN2P3 & Université Paris-Sud)
European Gravitational Observatory (Consortium, CNRS & INFN)



Welcome!

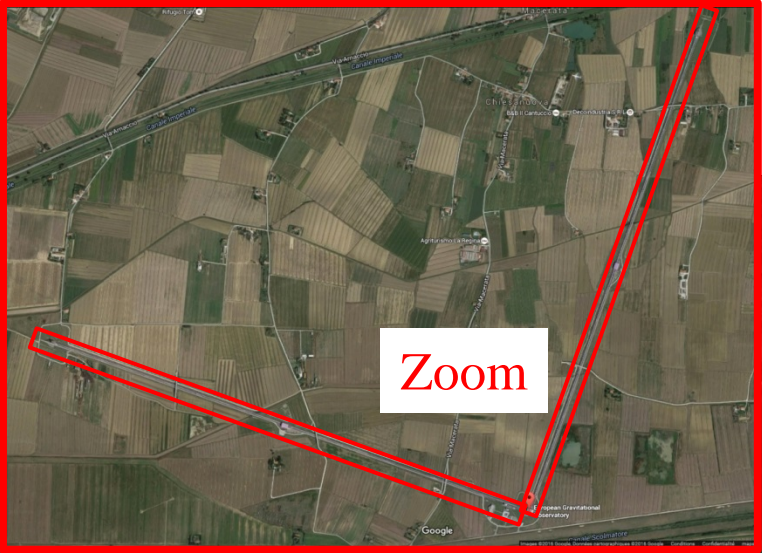
- Welcome to the **European Gravitational Observatory (EGO)**
 - **Site of the Virgo experiment**
- Virgo is a **giant** (3-km arms) **suspended** and **recycled Michelson interferometer** designed to make **direct detections of gravitational wave (GW)** signals
- **Advanced Virgo (AdV)** is the second generation Virgo detector
 - **Commissioning in progress after a 5-year upgrade**
 - **Goal: improve the overall sensitivity by one order of magnitude**
- **Advanced Virgo joined the two Advanced LIGO (aLIGO) detectors on August 1, 2017 for a first common data taking period**
 - **Until August 25**

→ **Two detections announced: GW170814 and GW170817**

The Virgo site

Leaning Tower of Pisa

Pisa airport
Runway length: 3 km



Virgo

European Gravitational Observatory

The Virgo Collaboration

- 6 European countries



- 21 laboratories

- About 300 members (LIGO : 750)



The Virgo Collaboration

- 6 European countries



- 21 laboratories

- About 300 members (LIGO: 750)

- Virgo was built by 11 **CNRS** (France) and **INFN** (Italy) laboratories

- Budget: ~150 M€
- Groups from the Netherlands, Poland, Hungary and Spain joined later the project

- Advanced Virgo funding: ~20 M€

- Plus in-kind contribution from NIKHEF

- The **EGO** (European Gravitational Observatory) consortium is managing the Virgo site in Cascina. It provides the infrastructures and resources to ensure the detector construction and operation

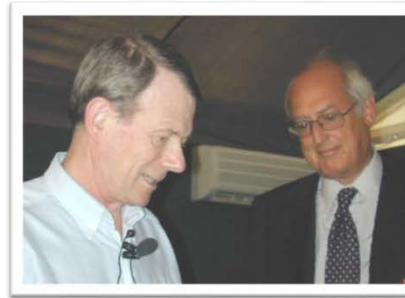
APC Paris
ARTEMIS Nice
EGO Cascina
INFN Firenze-Urbino
INFN Genova
INFN Napoli
INFN Perugia
INFN Pisa
INFN Roma La Sapienza
INFN Roma Tor Vergata
INFN Padova
INFN TIFPA
LAL Orsay – ESPCI Paris
LAPP Annecy
LKB Paris
LMA Lyon
NIKHEF Amsterdam
POLGRAW (Poland)
RADBOUD Uni. Nijmegen
RMKI Budapest
Valence University

VIRGO TIMELINES

- 1985: Alain Brillet (CNRS, France) and Adalberto Giazotto (INFN, Italy) start collaborating
- 1989: First Virgo proposal submitted
- 1994: Project approved by CNRS and INFN
- 1996: Site construction starts in Cascina, near Pisa (Tuscany)



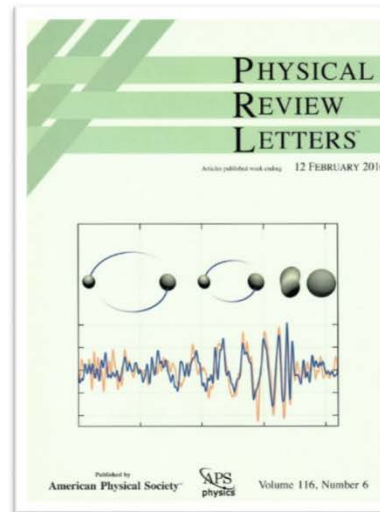
Aerial view of the site construction near Cascina (Italy)



Left: A. Brillet, right: A. Giazotto

- May 2007: Creation of the LIGO-Virgo Collaboration, signature of an agreement on the full sharing of data, joint data analysis and common publications
- 2007-2011: Data-taking periods for the initial Virgo detector
- 2011-2016: Pluriannual upgrade program leading to the second generation detector: Advanced Virgo
- 2015: First detection of gravitational waves by LIGO and Virgo
- 2016-2017: Advanced Virgo commissioning
- August 2017: Advanced Virgo joint data-taking with LIGO
- September 27, 2017: announcement of the first three detectors observation of gravitational waves

- December 2001: Creation of the European Gravitational Observatory by CNRS and INFN
- 2003: End of site construction and inauguration
- 2006: The Netherlands (Nikhef Institute) join the Virgo Collaboration – followed later by Poland (IMPAN), Hungary (Wigner Institute) and Spain (University of Valencia)



Cover of the Gravitational Waves detection paper published on February 12, 2016



Program of today's visit

- Indico page: <https://events.ego-gw.it/indico/conferenceDisplay.py?confId=61>

Visite Master2 P3TMA (Marseille)

chaired by Nicolas Arnaud (LAL (CNRS/IN2P3 & Université Paris-Sud)), Severine Perus

Tuesday, 17 October 2017 from **08:00** to **18:00** (Europe/Rome)
at EGO, Virgo site

Manage ▾

Description The details of the afternoon visit will depend on the site activities scheduled for that day.

Material [A selection of educational resources in English](#) [Virgo news](#) [Virgo public website](#)
[Virgo status](#) [h -- The Gravitational Voice](#)

Tuesday, 17 October 2017

10:00 - 10:30	Welcome, presentation of the visit 30' Speaker: Dr. Nicolas Arnaud (LAL (CNRS/IN2P3 & Université Paris-Sud))	▾
10:30 - 11:30	The Advanced Virgo gravitational wave detector 1h0' Speaker: Dr. Nicolas Arnaud (LAL (CNRS/IN2P3 & Université Paris-Sud)) Material: Virgo animation (Marco Kraan, NIKHEF)	▾
11:30 - 12:30	Gravitational wave detections 1h0' Speaker: Dr. Nicolas Arnaud (LAL (CNRS/IN2P3 & Université Paris-Sud))	▾
12:30 - 13:30	Gravitational wave and multi-messenger astronomy 1h0' Speaker: massimiliano razzano (Physics Department of the University of Pisa and INFN-Pisa)	▾
13:30 - 15:00	Déjeuner	
15:00 - 16:30	Site visit 1h30' Speaker: Dr. Valerio Boschi	▾

Virgo from the sky

