

Today's visit

Virgo/EGO visit, 2018

Nicolas Arnaud (narnaud@lal.in2p3.fr)

Laboratoire de l'Accélérateur Linéaire (CNRS/IN2P3 & Université Paris-Sud)

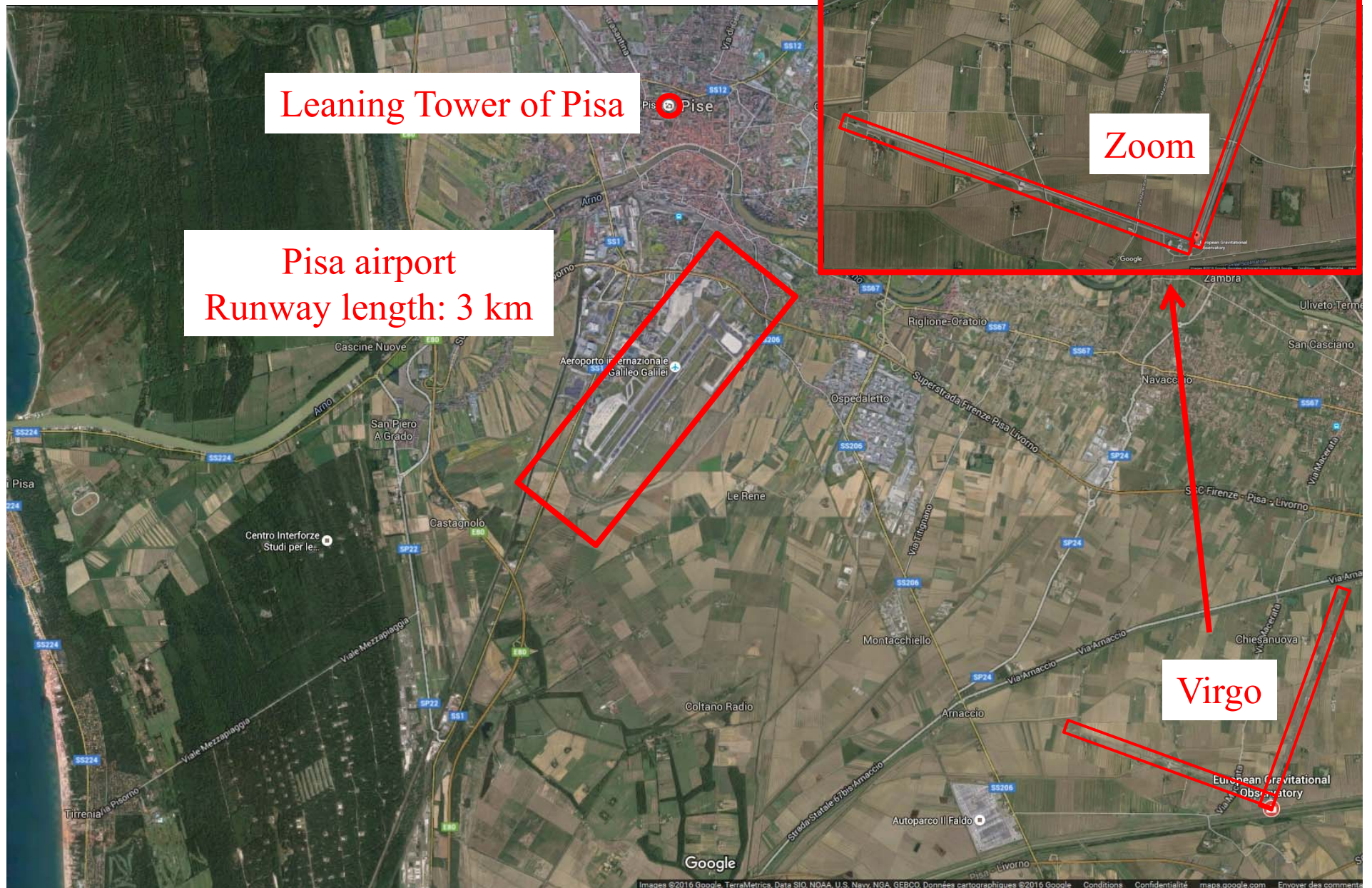
European Gravitational Observatory (Consortium, CNRS & INFN)



Welcome!

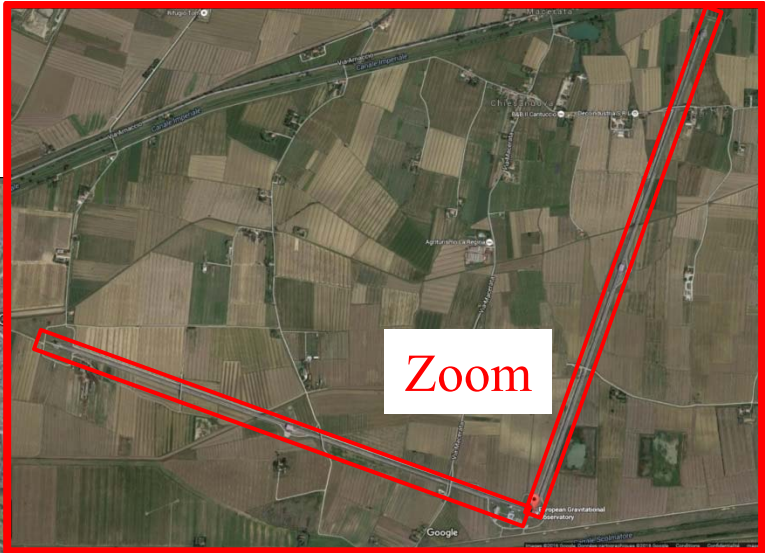
- Welcome to the **European Gravitational Observatory (EGO)**
 - **Site of the Virgo experiment**
- Virgo is a **giant** (3-km arms) **suspended** and **recycled Michelson interferometer** designed to make **direct detections of gravitational wave (GW) signals**
- **Advanced Virgo (AdV)** is the second 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, 2017**
 - **Two major detections: GW170814 and GW170817**
- **Currently: commissioning period, following a major upgrade of the detector**
 - **Goal: improve the sensitivity by a factor ~ 2**
 - **Target: new joint LIGO-Virgo data taking period starting early 2019**

The Virgo site



Leaning Tower of Pisa

Pisa airport
Runway length: 3 km



Zoom

Virgo

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)
RADBOD Uni. Nijmegen
RMKI Budapest
Valence University

A bit of history

- 1980's: Collaboration between **Alain Brillet** (CNRS, Orsay, lasers) and **Adalberto Giazotto** (INFN, Pisa, suspensions)
- 1989: **Proposal**
- June 27 1994: **Project approved** by CNRS and INFN
- May 1997: Final **design report**
- 2003: **End of construction phase**
- 2007-2010: **Data taking periods**
 - Virgo first, then Virgo+
- 2011-2016: **Upgrade to Advanced Virgo**
 - 2015: **first direct detections of gravitational waves**
 - Data recorded by Advanced LIGO, jointly analyzed by LIGO and Virgo
- 2016-2017: **Advanced Virgo commissioning**
- 2017: **First joint Advanced LIGO – Advanced Virgo data taking period**
 - August 2017: **first detections** by the **LIGO-Virgo 3-detector network**



Virgo from the sky

