



ET\_ITALIA



CdS – preventivi 2020

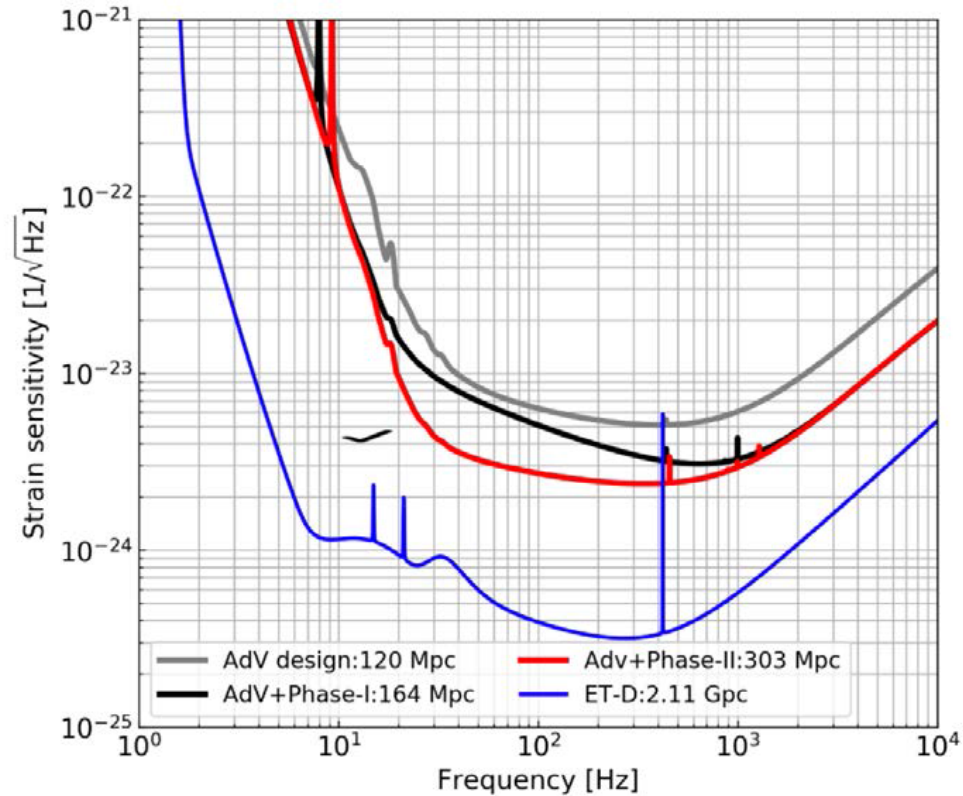
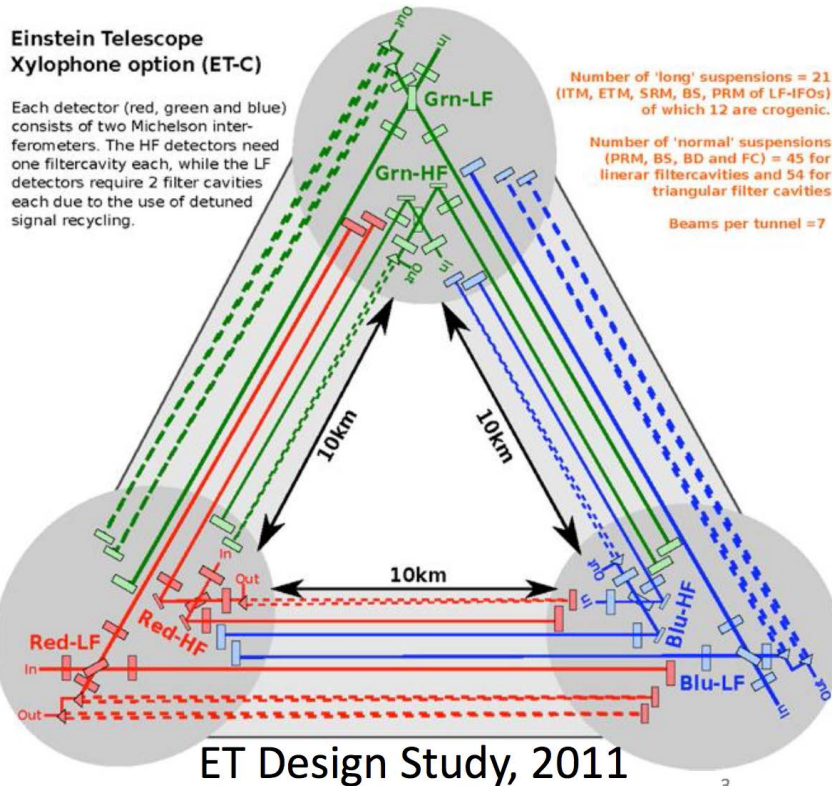
F. Sorrentino

1 luglio 2019

# Einstein Telescope design study (2011)

## Einstein Telescope Xylophone option (ET-C)

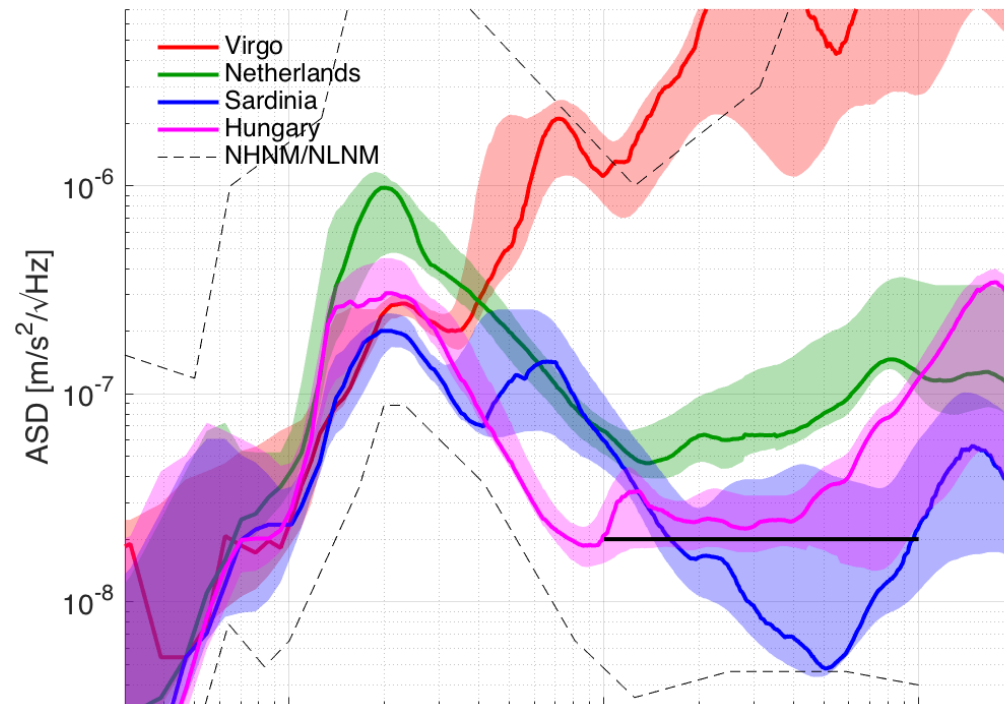
Each detector (red, green and blue) consists of two Michelson interferometers. The HF detectors need one filtercavity each, while the LF detectors require 2 filter cavities each due to the use of detuned signal recycling.



[https://tds.virgo-gw.eu/?call\\_file=ET-0106C-10.pdf](https://tds.virgo-gw.eu/?call_file=ET-0106C-10.pdf)

# ET: from concept to realistic implementation

- Identify requirements for the infrastructure
- Put it in a realistic context (candidate sites)
- Do a preliminary feasibility study and costing
- Develop crucial technologies:
  - improvement of the VIRGO **seismic attenuation system**, to improve the low frequency sensitivity and to maintain the INFN historic leadership in this field
  - design, construction and test of a **cryogenic payload**
  - development of innovative **frequency dependent squeezing** techniques, to reduce quantum noise;
  - improvement of the (optical and mechanical) losses of the **mirrors' coatings**, to reduce thermal noise



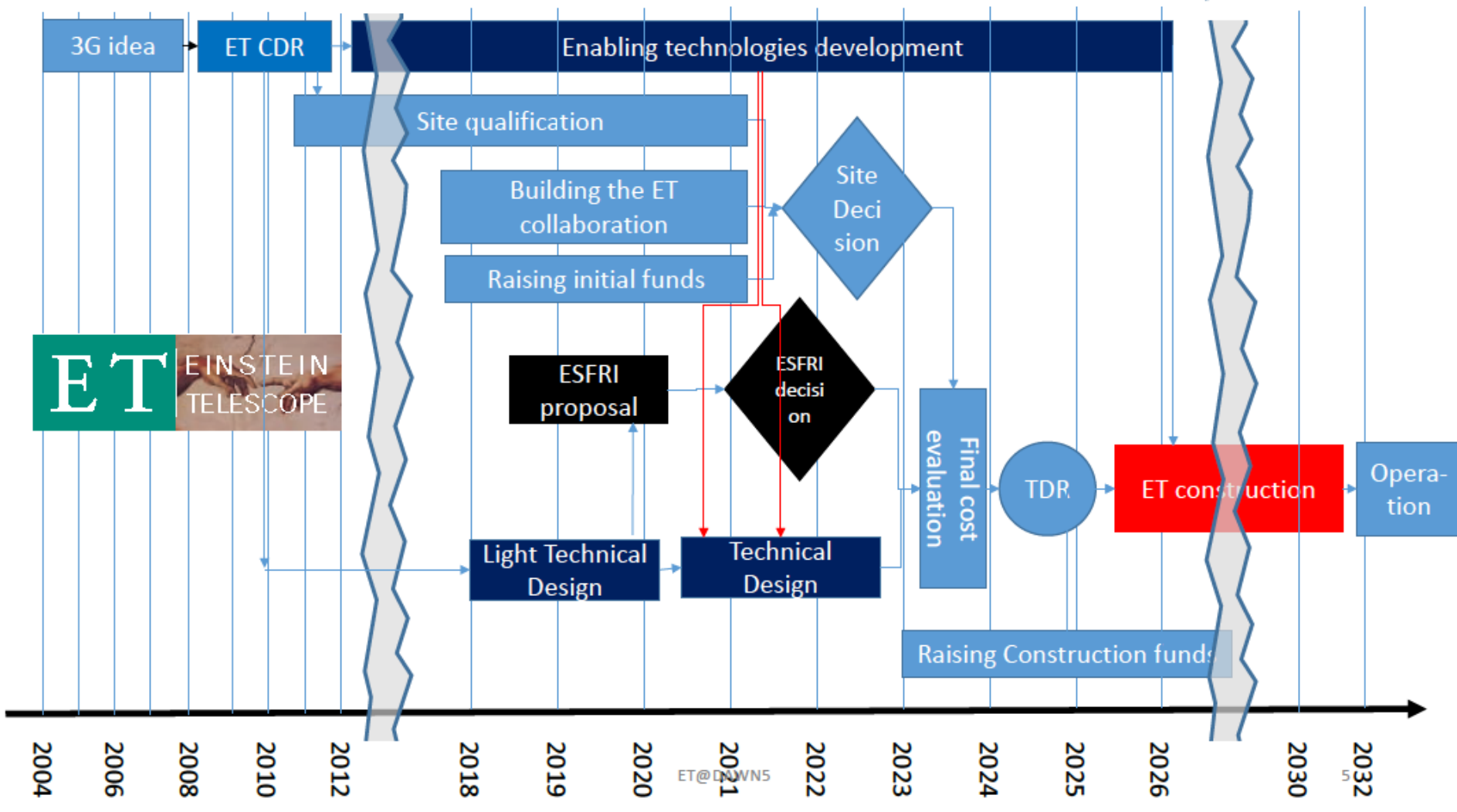
# ET: current status

- Key recent events determining current status of the project:
  - 9<sup>th</sup> ET symposium (EGO, 19÷20<sup>th</sup> of April 2018)
    - ET project Roadmap presentation
    - Kick-off the ET collaboration forming procedure
    - Letter of Intent
    - ET steering committee
  - 10<sup>th</sup> ET symposium (Sardinia, 11÷12<sup>th</sup> of April 2019)
    - Presentation of the ET management bodies and of the first ET statute
    - ET Writing Team activity presentation
    - Visit at the local site candidate to host ET
    - Hot discussion on geometries, costs, national engagement

# ET: project roadmap

- ET has a clearly defined project roadmap:
  - 2018-2019 Form the ET collaboration
  - 2019-2020 ESFRI roadmap
    - Light TDR to be realised, refine CDR cost evaluation, key options to be selected, ESFRI proposal
  - 2022 Site Selection
    - Technical/political activity
    - Requirements need to be compared with the site characteristics through an intense experimental activity in the next 3 years
  - 2023 Full Technical Design Report
    - Cost definition
  - 2025 Infrastructure realization start (excavation, ....)
  - 2030 -2031 end of infrastructure construction, beginning of installation
  - 2032+: installation / commissioning / operation

# ET: project roadmap



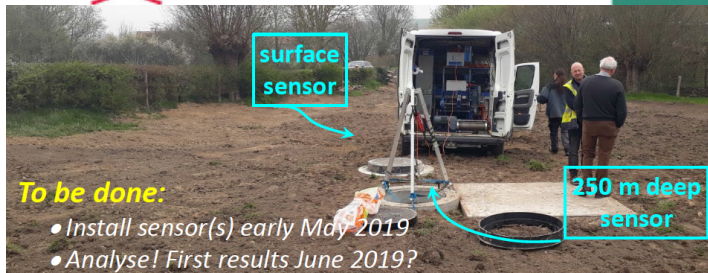
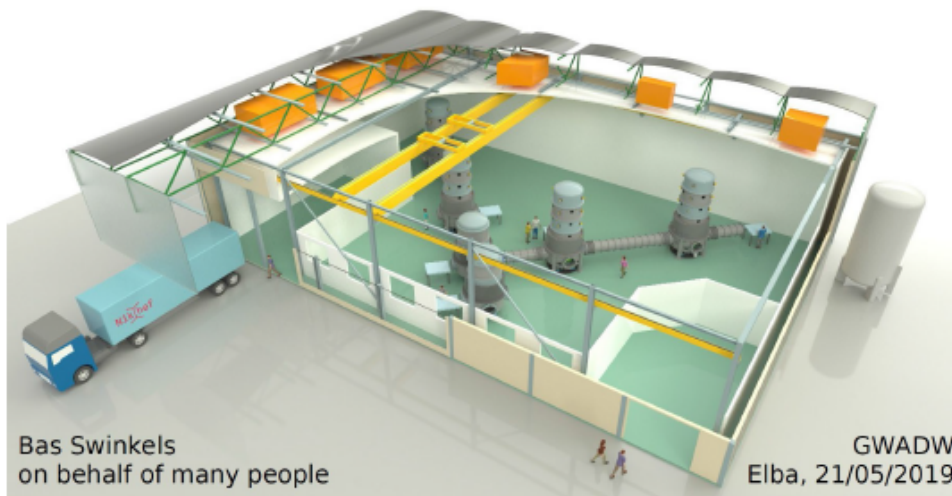
# National activities

- Currently only two sites are candidate to hosts the ET infrastructure
  - The three borders region (NL, BE, DE)
  - SosEnattos(Sardinia, Italy)

# National activities - Maastricht

## ET Pathfinder activities

### ET Pathfinder in Maastricht



## Why in Maastricht?



## Funding & partners



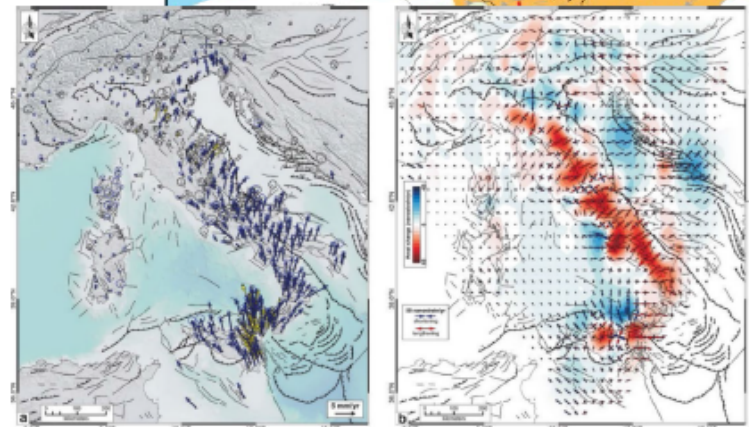
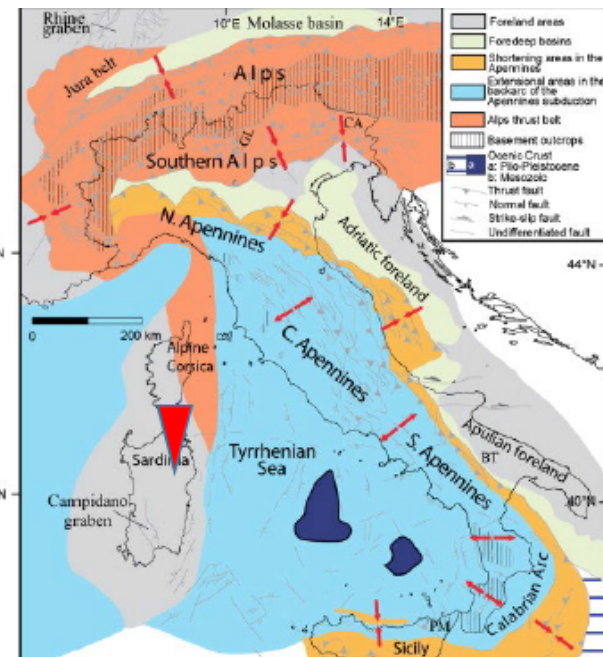
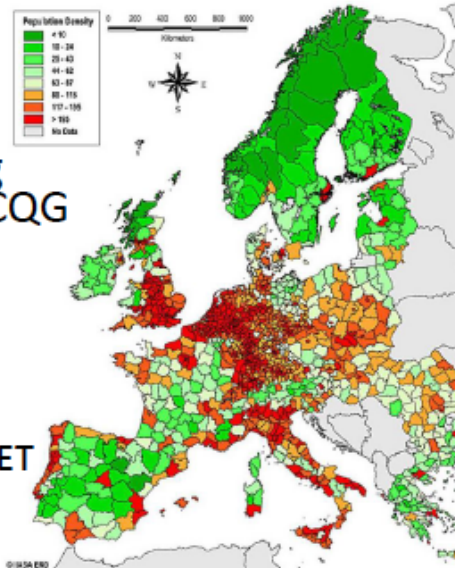
- Obtained ~14.5 MEuro funding from unconventional sources:
  - InterReg Flanders-South of NL (European fund for cross-border development)
  - Province of Limburg (NL), Dutch and Belgian national ministries
  - Matched contribution by partners
- Partners: Nikhef, universities of Antwerpen, Eindhoven, Ghent, Hasselt, Leuven, Maastricht
- Satellite partners: Aachen, Brussels, Fraunhofer, Liège, Louvain la Neuve, Twente, TNO
- Additional input from Glasgow, AEI, Perugia ...
- 100+ person-years (staff scientists and engineers) committed over the next 5 years
- New collaborators are welcome



# National activities – Sos Enattos



## Sardinia - Italy



ET@DAWN5

- Site (preliminarily) qualified with a long measurement campaign, published in CQG
- Very high quality geological, seismic, constructive and environmental characteristics
- Support of the Italian Government
  - 17 M€ promised to support AdV+ and the ET site candidature
    - 5.5M€ delivered in 2018
    - 2.5M€ delivered by Sardinia region
    - 1M€ from Research Ministry (PRIN)
- Direct involvement of the largest academic institutions in Italy:
  - INFN, INAF, INGV
  - University La Sapienza Rome
- Direct involvement of the Sardinian Universities:
  - UniSS, UniCa

# Role of INFN-Genova group

- Frequency dependent squeezing (EPR)
- Newtonian noise mitigation
- R&D on mirror coatings @ low temp
- Vacuum and cryogenics
- Strong support to the candidate site in Sardinina (Sos Enattos mine)

# Anagrafica e servizi

- Ricercatori:
  - F. Sorrentino (Ric., coord. loc.) 0.4
  - G. Gemme (Dir. Ric.) 0.4
  - A. Cirone (PhD) 0.4
- Servizi: n.a.