

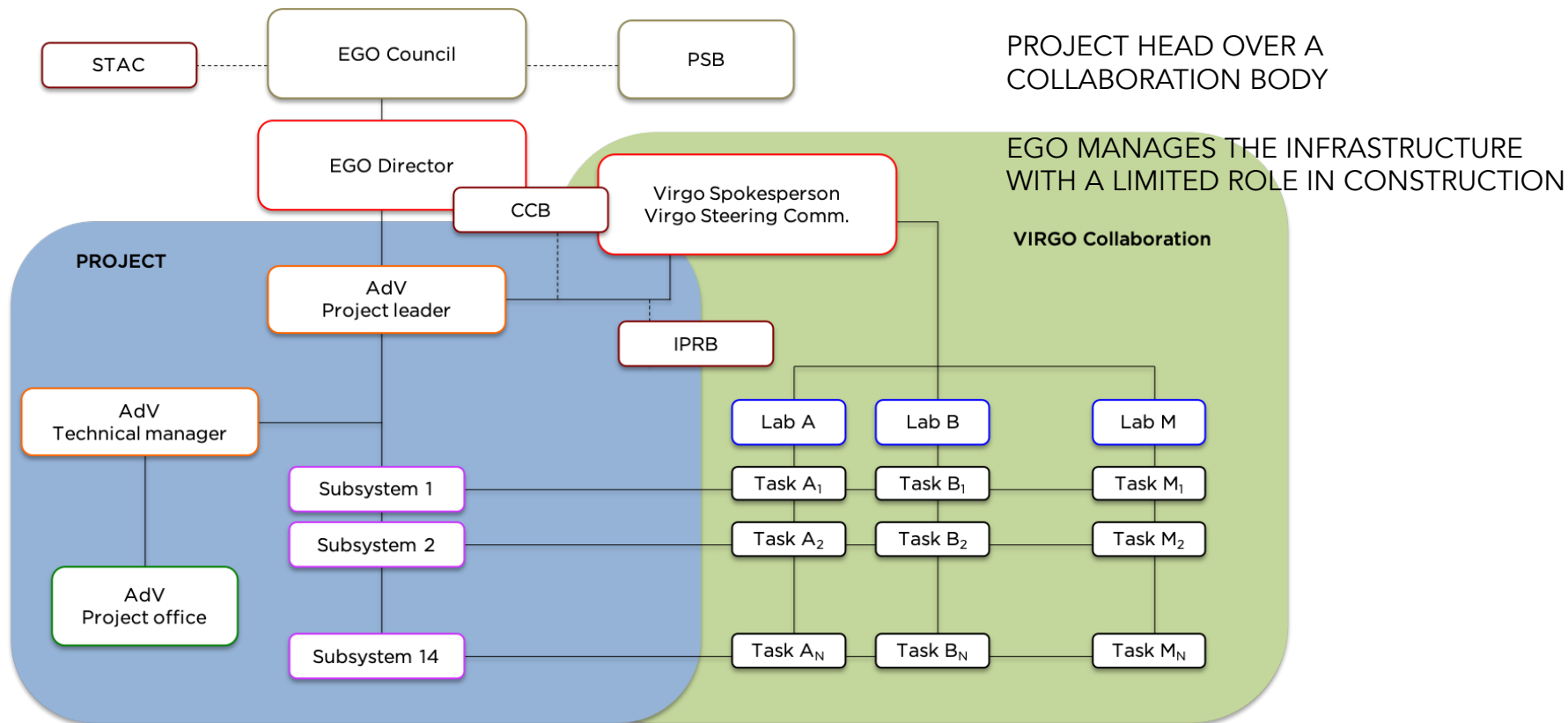


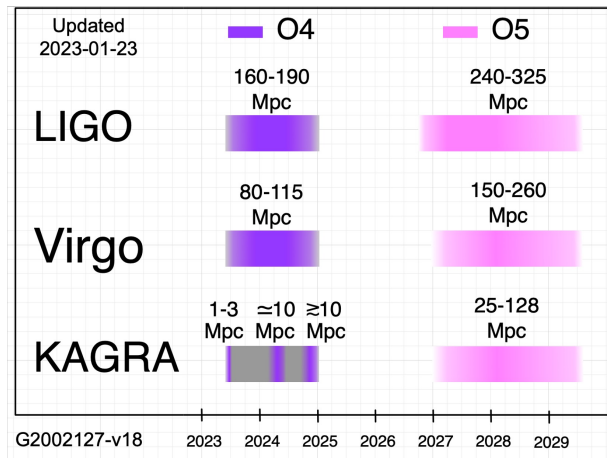
Meeting with the EGO/Virgo organization committee

Giovanni Losurdo

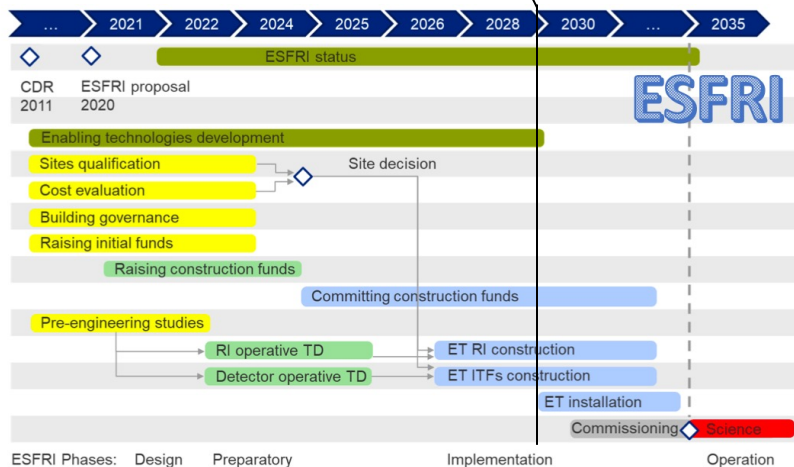


A "mild" project structure





We know this schedule is Unrealistic. Good to put pressure on govts but...

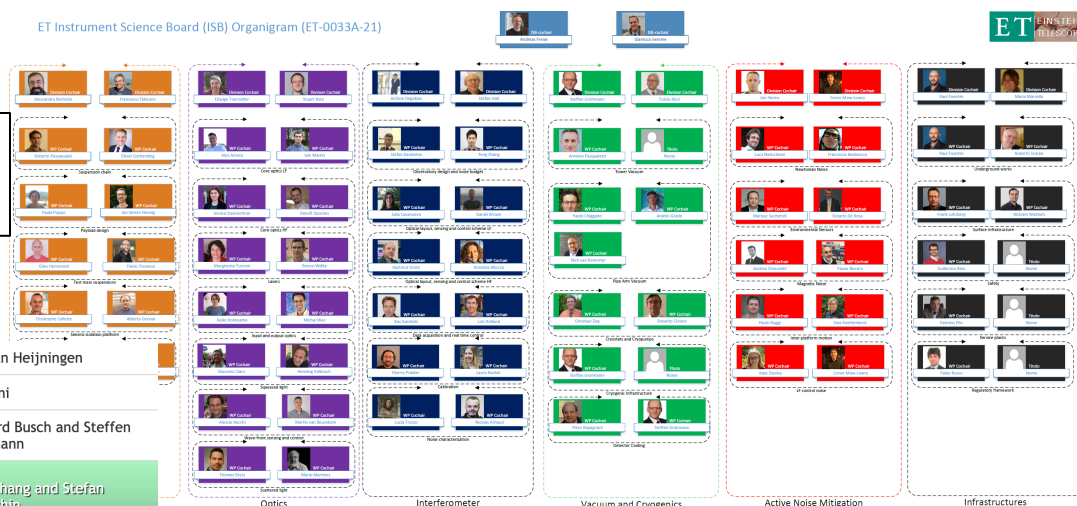


...it is putting a lot of pressure in the community as well



48 "boxes" (60%) managed by Virgo members

ET Instrument Science Board (ISB) Organigram (ET-0033A-21)



ET-0379A-21	ETPF	In-vacuum cabling for ETPf's detection bench suspensions	19/07/21	J.V. van Heijningen
ET-0377A-21	ET	ET-SQZ meeting slides 2021/07/15	16/07/21	G. Ciani
ET-0376A-21	ET	Conceptual layout of a helium cooling system for ET-LF	15/07/21	Lennard Busch and Steffen Grohmann
ET-0375A-21	ET, VIRGO, LVC	ISB-wide meeting on SusTN: How to use PyGWINC for plotting ET sensitivity curves	14/07/21	Teng Zhang and Stefan Danilishin
ET-0374A-21	ET, VIRGO	Superattenuator	12/07/21	Alberto Gennai
ET-0373A-21	ET	Laser Options for ET-LF	12/07/21	Benno willke
ET-0372A-21	ET	Optics Division meeting on ET-LF wavelength: Introduction	12/07/21	Stuart Reid, Edwige Tournefier
ET-0371A-21	ET	Passive ring laser gyroscopes as highly sensitive rotation sensors	12/07/21	Simon Stellmer
ET-0370A-21	ET	Characterizing rotational ground motion in Ambient seismic noise	09/07/21	Celine Hadzioannou
ET-0369A-21	ET	Long period tilt induced by fluctuations of air-pressure	09/07/21	Thomas Forbriger
ET-0368A-21	ET	The bridge from 10mHz to 10Hz - July 2021 ANM meeting	09/07/21	Conor Mow-Lowry
ET-0367A-21	ET	Input Output Optics ET-LF wavelength choice considerations (additional pages)	09/07/21	M. Was, K. Kokeyama
ET-0366A-21	ET	Wavefront Sensing and Control: ET-LF wavelength	09/07/21	A. Rocchi and M. van

Survey on ET document repository (March-October 2021):
 >80% of the documents authored by Virgo members



- There has been a rush to get a role in the ISB WBS (2020), which created tensions on the Virgo frontline
 - The ESFRI schedule and the large number of "seats" (co-chairs) did not help...
- The impact of ET (and ET-Pathfinder) on Virgo is more and more visible
- Big concern for the impact of ETIC
 - Shortage of competent people
 - Tight and inextensible schedule



Virgo authorship

- 3.2.2.3. The unit used to quantify time contributions is the standard Virgo annual contribution (SVAC), which by definition corresponds to a weekly effort of 35 hours during 46 weeks of a year.
 - 3.2.2.4. According to the number of hours dedicated in a year by a member to Virgo work, its contribution is expressed as a fraction of SVAC, bound to a maximum value of 1.
 - 3.6.2. Virgo members who have made substantial contributions to the Virgo core program and whose time contribution is above a threshold of 0.4 SVAC (§3.2.2.3) earn the right to default authorship on all Collaboration publications.
 - 3.6.5. For members on permanent or temporary faculty positions with mandatory teaching duties, the threshold is reduced to 0.2 SVAC (§3.2.2.3).
- Authorship is earned working for Virgo 14 hrs/week (7 in case of teaching duties) on average (excluding 6 wks of holidays)

FORMING THE NEXT 3G DETECTOR EXPERTS

a proposal

(presented to INFN and EGO director in February '23)



THE PROBLEM

- GW detectors are extremely complex and far from being operated "as telescopes"
- Virgo is suffering from shortage of detector experts
- The available ones are fully committed (either on Virgo or on new ET R&D programs) and have no time to train new ones



THE FRAMEWORK

- Large growth of GW community after 1st detection
- However, very difficult to recruit students willing to focus their career on detector aspects
- Survey of Virgo PhD theses in 2021: 82 registered
 - 12 on detector/R&D (15%)
 - Only 3 on "urgent" detector aspects
- Several reasons:
 - Progressive reduction of R&D programs in the lab following the construction of Virgo and the approval of Advanced Virgo;
 - Fatal attraction of data analysis and theoretical physics in a discovery era;
 - Difficulty in providing adequate formation and mentoring on detector aspects;
 - ...

(*) = detector, data analysis, computing, R&D, ...

	First name	Last name	Group	Thesis Director	Thesis area (*)	Thesis topic	PhD start/end dates
1	Panagiotis	Iosif	AUTH	N. Stergioulas	data analysis	Models of binary neutron star remnants	2012-2021 (defended on May 6, 2021)
2	Dimitrios	Pesios	AUTH	N. Stergioulas	data analysis	Data analysis of GWs from the post-merger phase of BNS mergers	2021-2024
3	Paraskevi	Nousi	AUTH	A. Tefas	data analysis	CBC data analysis with machine learning (20%), Computational Intelligence for Digital Media (80%)	2015-2021
4	Nikolaos	Floropoulos	AUTH	A. Tefas	data analysis	CBC data analysis with machine learning (10%), Computational Intelligence for Digital Media (90%)	2017-2022
5	Pierre-Alexandre	Duverne	IJCLab	Patrice Hello	data analysis	multi-messengers + map reconstruction	2019-2022
6	Jean-Grégoire	Ducoin	IJCLab	Nicolas Leroy	data analysis	GRB and detector characterization	2018-2021
7	Marion	Pillas	IJCLab	Tito Dal Canton	data analysis	analysis with pyCBC	2020-2023
8	Marc	Arène	APC	Ed Porter	data analysis	HMC Bayesian estimation for CBC	2017-2021
9	Cyril	Cano	APC	Nicolas Lebiha and Eric Chauss	data analysis	GW polarization reconstruction and characterization	2019-2022
10	Konstantin	Leyde	APC	Danièle Steer and Eric Chass	data analysis	GW cosmology	2020-2023
11	Auclair	Pierre	APC	Danièle Steer	data analysis and theory	Cosmic strings	2018-2021
12	Jose Francisco	Nuño Siles	IFT-Madrid	Juan García-Bellido	data analysis and theory	Primordial Black Holes	2020-2024
13	Gonzalo	Morras	IFT-Madrid	Juan García-Bellido	data analysis and theory	Cosmic Hyperbolic Encounters	2020-2024
14	Santiago	Jaraba	IFT-Madrid	Juan García-Bellido	data analysis and theory	Stochastic Background	2021-2023
15	Maria	Assiduo	Firenze-Urbino	Gianluca M Guidi	data analysis	CBC detection	2020-2023
16	Vincent	Boudart	BelGrav - Belgium	Maxime Fays	data analysis	GW detection using Artificial Intelligence	2019-2023
17	Grégory	Baltus	BelGrav - Belgium	Jean-René Cudell	data analysis	CBC detection/early alert/ ML	2019-2022
18	Antoine	Depasse	BelGrav - Belgium	Giacomo Bruno	data analysis	GW detection of vector boson clouds signals	2019-2023
19	Federico	De Lillo	BelGrav - Belgium	Giacomo Bruno	data analysis	Anisotropies in Stochastic Gravitational Wave Background	2020-2023
20	Pablo	Barneo	ICCUB-Barcelona	Jordi Portell	data analysis	RF-OF-based denoising methods to improve unmodelled GW detection capabilities	2019-2022
21	Kevin	Turbang	Belgium	Alberto Mariotti, Alexander	data analysis and theory	Stochastic background of GWs: from models to observations	2020-2024



- The complexity of Virgo is increasing with the upgrades
- The "team of expert" does not grow accordingly (and it's aging!)
- Growing risk for O5, for Virgo_nEXT, for ET
- We urgently need a plan to ensure formation of a new generation of highly motivated experts, in view of the 3G advent
- The following proposal has the goal of attracting towards Virgo (and eventually to ET) **detector** high-level experts and students



GIAZOTTO FELLOW PROGRAM

- A multi-year (~20) attractive program of FELLOWSHIPS and PhD scholarships
 - Competitive salary
 - Prestige (selection, link to academy)
- RATIONALE: train, year after year, a large number of high level experimentalists able to run Virgo and its upgrades and eventually run and lead ET
- Two categories:
 - GIAZOTTO FELLOW (Senior/Junior)
 - GIAZOTTO GRADUATE



GIAZOTTO FELLOW

- 1-2 yrs fellowship (CERN fellow model)
 - Can be attractive also for non-Virgo experts (US/J/D/UK)
- Based at EGO but linked to academy (SNS?, Unipi?)
 - The Fellow can teach in university courses
 - A link with Accademia dei Lincei?
- Tasks:
 - Help on Virgo
 - Mentor students on site
- Two levels
 - SENIOR
 - JUNIOR (post-doc)



GIAZOTTO GRADUATE

- PhD scholarships funded or co-funded by the program, assigned on competitive basis
- PhD project must be focused on GW detector, hands on Virgo (large fraction of time spent on site)
 - Extra funds for travels and training at LIGO/Kagra
 - Synergies with other ET-focused facilities to be evaluated
- Can be (co-)mentored by Giazotto Fellows
- Two possible approaches (each with pros and cons)
 1. A special program in a Pisa institution (SNS?) upon an agreed scheme
 2. Funds can go to any Universities



- The minimum target should be to recruit every year:
 - 1 senior fellow
 - 1 junior fellow
 - 2-3 PhDs
- Rough cost: ~250 kE/yr (~5 ME for 20 yrs)
- STRATEGIC INVESTMENT

RESEARCH AREAS (SOME IDEAS...)

- Understanding/improving the LF noise in ITF
- Designing 21st century controls for the ITF
- The impact of imperfect optics on ITF robustness/sensitivity
- Improving the squeezing in imperfect ITF
- Managing multi-dof thermal control of ITF
- Wideband reduction of ITF coupling to environment
- ...



CAVEATS

- The program works if it is based on additional funding
 - It is not meant to replace the usual fellowship program (AdV, Adv+, EGO) which is crucial and should continue as usual
 - It is not meant to divert funds from R&D vital for Virgo_nEXT
- Mentoring-labs connection: the Fellow will work in strict coordination with the groups responsible for the concerned subsystems
- An international program would be a plus
 - It requires contributions from different agencies
 - It can be a next step after a start based on Italian only funds
- In the future, when ET is realized, the program can evolve and change the focus from EGO to the ET site