Letter of Intent

To: EGO Director – EGO Council Chair – Virgo Spokesperson

From: INFN Genoa – Virgo Genoa Group

Contact: Andrea Chincarini – andrea.chincarini@ge.infn.it

Subject: Expression of Interest to Join VirgoLab

Dear Sir/Madam,

This letter serves as a formal expression of interest by INFN-Genova group to join the VirgoLab, as described in VIR-1025B-24. We understand that VirgoLab operates, commissions, and upgrades the Virgo interferometer, and we are willing to contribute to its mission and to the achievement of its goals.

1. Introduction

INFN-Genova is a research unit within INFN and the University of Genoa, specializing in interferometer commissioning, quantum noise reduction, novel coating development and environmental noise characterization. We actively contribute to core activities of the Virgo Collaboration. Our expertise and ongoing research activities are highly relevant to the operation, commissioning, and potential upgrades of gravitational wave interferometers and are well aligned with VirgoLab's technical and scientific goals.

Participation in VirgoLab would enable us to deepen our involvement in instrument commissioning and upgrades while sharing our expertise in coatings, optical systems, environmental monitoring, and commissioning.

2. Scientific / Technological Case

Our research addresses multiple technical challenges relevant to VirgoLab's current and future projects:

- Quantum Noise Reduction: We are developing and testing squeezing setups at the 1500W lab at EGO, contributing to the Optics & Light Sources Technical Team.

- Advanced Mirror Coatings: In collaboration with LMA and other partners, we conduct R&D on low mechanical loss coatings (e.g., titania-germania, silicon nitride) including annealing optimization, spectroscopic ellipsometry and measurement of ultralow optical absorption.
- Environmental Noise Mitigation: We are actively involved in developing magnetic noise budgets and mitigation strategies, as well as designing a test mass charge monitoring system.
- Detector commissioning: Our group contributes to the commissioning of the detector, with a strong involvement in the Interferometer Sensing & Control subsystem, devoted to the global longitudinal and angular controls of the interferometer.
- Operations: Our group contributes to the Rapid Response Team, in terms of shifts and manpower, to guarantee a prompt analysis and vetting of any candidate gravitational waves signal during the Observing Runs of the detector.

3. Proposed Contribution

Our involvement in VirgoLab would include:

- Instrumentation Support: Continued work on quantum noise suppression, charge monitoring, and magnetic noise diagnostics.
- Technical Development: R&D on novel coating materials and annealing processes; implementation of real-time optical characterization methods.
- Detector Commissioning: Maintain a strong involvement in the Commissioning of current and future upgrades of the Detector in the relevant areas of expertise of the group.
- Operations: Participation in the Rapid Response Team efforts in guaranteeing a steady analysis of the detected signals during the Observing Runs of the Virgo interferometer.

We are also open to contributing to other areas based on the evolving needs of VirgoLab and the expertise within our group. We are keen to engage with the existing VirgoLab Technical Teams and Projects to identify areas where our skills and resources can be most effectively utilized.

4. Resources and Commitment

Initially, we anticipate contributing approximately 4.0 FTE from our current team. A significant portion of the proposed FTE comes from members on temporary contracts, such as PhD students and Postdocs, and the overall group contribution can vary over time. We understand that the successful accomplishment of VirgoLab tasks, particularly the timely installation and commissioning of the O5 upgrade, will demand strong and continual presence at EGO site. Our group commits to support that effort as much as reasonably possible when the need falls within the scope of our expertise.

We anticipate the need for support for travel to EGO and access to EGO infrastructure.

We are aware that financial resources are allocated by EGO Council, national funding agencies, or research organizations. We will explore potential funding opportunities through our institution and national agencies to support our involvement in VirgoLab.

We are prepared to operate and maintain equipment we provide, assuming the relevant personnel resources are adequately funded and available. Commitments for specific activities shall be formalized through a MoA with EGO, and shall be subject to regular review.

5. Stakeholders and Requirements

Our primary stakeholders are INFN and the University of Genoa. Our institutional responsibilities lie with these entities, and these relationships naturally shape our priorities, particularly concerning the training and career development of our young researchers, whose positions are often tied to specific institutional programs and funding cycles.

We understand that as a contributing group, our main requirements would be to have effective communication channels within VirgoLab, opportunities for our members to actively participate in relevant projects and technical teams, and recognition for our contributions to the scientific and technical advancements of Virgo.

We are committed to adhering to the policies and procedures of VirgoLab, including those related to resource allocation and publications.

We are ready to discuss our potential participation further and provide any additional information that may be required. We look forward to the possibility of joining the VirgoLab and contributing to its continued success.

Sincerely, Andrea Chincarini Group Leader, Virgo Genoa Group (INFN Genoa)