

Letter of Intent between EGO and IHEP regarding studies in multi- messenger astronomy

January 2022

Abstract

This Memorandum of Understanding (MoU) establishes a collaborative effort between the European Gravitational Observatory (EGO) and Institute of High Energy of Physics (IHEP) in order to launch a series of cooperation on studies on multi-messenger astronomy.

The purpose of this MoU is to reference the parties involved and to address the aspects in which they want to cooperate. By signing this MoU, the parties agree that they understand the nature of the collaborative work, consider it to be scientifically worthwhile, and will do their best to bring it to successful completion.

A Participating groups

1. EGO denotes hereafter the European Gravitational Observatory. It is described in Attachment A to this MoU.
2. IHEP denotes hereafter scientific/operating groups of high energy (HE) satellite projects which are/will be operated and managed by IHEP. Those HE satellite projects include Insight-HXMT, GECAM and SVOM/GRM. It is described in Attachment B to this MoU.

B Forms of cooperation

Multi-messengers observation

The participating institutions will assist to establish agreements between LIGO-Virgo Collaboration (LVC) and the Scientific and operation groups of Insight-HXMT/GECAM/SVOM, to cooperate on multi-messenger astronomy topics, including follow-up observation on HE counterpart to GW, targeted search in archival data, sub-threshold joint-observation on GW/Gamma-ray bursts events, joint-data analysis, etc..

Studies in multi-messenger astronomy

The participating institutions will encourage their member staffs to establish collaboration on studies in topics of multi-messenger astronomy, including theoretical modeling, simulations, scientific application with the multi-messenger catalogues, etc..

Training/Staff exchange

The participating institutions will provide opportunities and supports on staffs/students from the other side to travel, communicate and study.

Joint publications

The participating institutions will encourage joint publication of scientific results between the collaborating parties.

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Shuang-Nan Zhang
 (Director of Key Laboratory of Particle Astrophysics, IHEP)

..... *S.-N. Zhang*
 Date **13th April, 2022**

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Stavros Katsanevas
 (Director of EGO)

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A Definitions EGO

CNRS and INFN signed an agreement on 27 June 1994 concerning the realization of a three kilometer Fabry-Perot interferometric antenna aimed at the detection of gravitational waves in the frequency range 10-10 000 Hz, named Virgo, located at Cascina, Italy. This agreement was superseded by the Agreement between CNRS and INFN, founding the “European Gravitational Observatory” Consortium under Italian law (EGO), signed on 11 December 2000, completed by the agreement signed with the Nikhef on July 2009, the Netherlands becoming an associated member.

The main purpose of EGO is to ensure the end of the construction of the Virgo antenna, its commissioning, its operation and its upgrade, as well as to promote an open co-operation in R&D. The Consortium is supervised by the EGO Council. The implementation of the above is performed via the involvement of the Virgo Collaboration in the framework of the Memorandum of Agreement between the Virgo Collaboration and EGO Consortium, signed on 20 November 2002.

The Virgo collaboration is composed of approximately 200 scientists and technicians coming mainly from CNRS and INFN laboratories, which have signed an Agreement on 19 December 2001, as well as from EGO, the Netherlands, Poland and Hungary. Decisions are taken by its steering committee. The overall scientific exploitation of the Virgo antenna is under the responsibility of the Virgo Collaboration

In this MoU the Virgo collaboration is represented by the spokesperson appointed by the Virgo steering committee and the EGO Consortium by the director of EGO appointed by the EGO council.

B Definitions of IHEP’s HE Satellites projects

IHEP’s High Energy Satellites projects involved in this joint-observation program including *Insight*-HXMT, GECAM and SVOM:

Insight-HXMT

The Hard X-ray Modulation Telescope (HXMT) , named ”*Insight*”, is China’s first X-ray astronomy satellite. There are three main payloads onboard, namely, the high energy X-ray telescope (20-250 keV, 5100 cm²), the medium energy X-ray telescope (5-30 keV, 952 cm²), and the low energy X-ray telescope (1-15 keV, 384 cm²). These payloads were built by the Key

Laboratory of Particle Astrophysics, IHEP. The main scientific objectives of Insight-HXMT are: (1) to scan the Galactic Plane to find new transient sources and to monitor the known variable sources, (2) to observe X-ray binaries to study the dynamics and emission mechanism in strong gravitational or magnetic fields, and (3) to monitor and study Gamma-Ray Bursts and Gravitational Wave Electromagnetic counterparts.

Insight-HXMT was launched in 15th June, 2017. The ground segment, which is composed by mission support branch and scientific application branch, is host by the Key Laboratory of Particle Astrophysics, IHEP.

GECAM

Gravitational wave high-energy Electromagnetic Counterpart All-sky Monitor (GECAM) was built and operated in the Key Laboratory of Particle Astrophysics, IHEP. It was launched on the 10th Dec. 2020. GECAM is designed specially for studying the γ -ray counterparts of gravitational waves. It consists of two small satellites (~ 150 kg/satellite) in the same Low Earth Orbit (~ 600 km, 29°) with opposite orbital phase.

SVOM/GRM

SVOM (Space-based multiband astronomical Variable Objects Monitor) is a joint mission of the China National Space Administration (CNSA) and French Space agency (CNES) that is set to send aloft a satellite to observe gamma-ray bursts (GRBs) from a 600-km Earth orbit.

The SVOM satellite will be carrying four instruments, ECLAIRs, MXT, GRM and VT, among which, the GRM were designed and built in the Key Laboratory of Particle Astrophysics, IHEP.