

JSPS Core-to-Core Programme

Project title: Establishment of gravitational waves astronomy

Project duration: 1 March 2012 – 31 March 2018

Japanese Scientific Lead: Seiji Kawamura, KAGRA Observatory, Institute for Cosmic Ray Research, University of Tokyo

UK Counterpart: Professor Sheila Rowan, University of Glasgow

Description of project

Gravitational wave signals from the most violent events in our universe, such as black holes or stars colliding, can now be observed from Earth using gravitational wave detectors. As we upgrade our current detectors or build new detectors, which incorporate different technologies, we will observe more signals from different types of astrophysical events. The aim of this project was to facilitate international discussions, collaborations and staff exchanges in order to share expertise on different technologies in cryogenics, mechanics and optics which could be implemented in the detectors. This collaborative effort improves the potential detector sensitivity to gravitational wave signals and provides us with a new method of investigating our universe.

Departments and institutions involved

The project partners were:

The University of Tokyo Institute for Cosmic Ray Research

Louisiana State University

Max Planck Society

NIKHEF

European Gravitational Observatory

University of Western Australia

Korea University

Beijing Normal University

National Tsing-Hua University

Inter-University Centre for Astronomy and Astrophysics

Hanoi National University of Education

Centre Nationale de la Recherche Scientifique (CNRS)

How collaboration started

Gravitational wave detection represents a significant large scale experimental challenge requiring interdisciplinary and international expertise. Whilst longstanding connections existed between

groups in the field, a focussed collaborative effort to build and design future detectors was identified as essential to facilitate implementation of new technologies.

Amount of money awarded

UK matched funding was 34,000 euro.

How the matching funds were sourced from your side and how it was used

Matching funds were sourced from the ELITES project which was funded by the EU FP7 Scheme and from additional research funding within the Institute. These funds were used to support the travel of scientists from the University of Glasgow to allow the research to take place, resulting in joint publications.

How participants are benefitting from the scheme/The collaborative developments since the project started and plans for the future

The funding provided the opportunity for scientists from across Europe and Japan with unique expertise in different areas to work closely together on the design and development of technologies relevant for gravitational wave detectors. The detector located in Japan, KAGRA, is currently being constructed informed in part by results from this collaborative effort. The project has resulted in joint publications, with collaborative research presented at international conferences and meetings. Students have benefited with relevant and topical PhD research related to the joint work.

Since the project began, gravitational waves have been detected directly for the first time. This period has seen enhanced interest both in extending the global network of gravitational wave observatories and in making future detectors of even higher.

Further applications to JSPS for funding or plans for this

An early career researcher from the University of Glasgow applied to JSPS for a fellowship following Glasgow's involvement in this core-to-core project. He moved to Tokyo for two years to work on the gravitational wave detector located in Japan. Another core-to-core program has been initiated called 'Unexplored Universe Disclosed by Gravitational Waves and Multi-Messenger Astronomy' to build on, and further develop, the existing network of expertise in order to maximise the science from the detectors and the field of gravitational wave astronomy.

Photos from the collaboration:

