HORIZON 2020

Gravitational Self-Force and Post-Newtonian Methods for Gravitational Wave Detection

Fact Sheet

Project Information

GravityWaveWindow

Grant agreement ID: 661705

DOI
10.3030/661705

Project closed

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20 October 2015

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1 April 2016

End date
31 March 2019

Funded under
EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions

Total cost
€ 248 063,40

EU contribution
€ 248 063,40

Coordinated by
UNIVERSITY COLLEGE DUBLIN, NATIONAL UNIVERSITY OF IRELAND, DUBLIN
Ireland

This project is featured in...

Objective

In the last 7 decades, leaps have been made in astrophysics in their ability to open new windows onto our universe. With every new window, came exciting new detections of the already known and as well as the unknown. We are now once more on the cusp of activating a new probing tool for revealing the secrets of our universe – gravitational wave astronomy.

Gravitational waves (GWs) are ripples in space-time that are predicted by Einstein's theory of relativity. They are unique in the fact that they are the only type of radiation that can be emitted by black holes; allowing their direct detection. GW astronomy also brings with it the exciting opportunity for tests of general relativity as well as other gravitational theories.

Black hole binaries (BHBs) make up a large number of systems that will be detectable by both ground and space based detectors. Detection, however, requires the accurate modelling of their waveforms, which in turn requires solving the two-body problem in General Relativity. The two-body problem in general relativity is a longstanding open problem going back to work by Einstein himself. With these advances in GW detector technology, this age-old problem has been given a new lease of life and is motivating numerical, analytical and experimental relativists to work together with the prospect of opening up this new window onto our universe.

This research will investigate the 3 current methods used to model BHBs, post-Newtonian (PN), Gravitational Self-Force (GSF) and Numerical Relativity (NR). The inital phase will involve the expansion of PN and GSF, under the supervision of world-leading experts. In the return phase, this newly gained knowledge will be combined with that of the hosts experts in NR and GSF to produce a cohesive outlook of BHB modelling, both extending and highlighting the benefits and applications of the 3 methods. This will extend and further cement the possibility and far-reaching consequences of detecting GWs.

Fields of science (EuroSciVoc)

natural sciences > physical sciences > **relativistic mechanics**

natural sciences > physical sciences > astronomy > observational astronomy > **gravitational waves**

natural sciences > physical sciences > astronomy > stellar astronomy > **neutron stars**

natural sciences > physical sciences > astronomy > astrophysics > **black holes**

natural sciences > physical sciences > **theoretical physics**

Programme(s)

H2020-EU.1.3. - EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions MAIN PROGRAMME

H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility

Topic(s)

MSCA-IF-2014-GF - Marie Skłodowska-Curie Individual Fellowships (IF-GF)

Call for proposal

H2020-MSCA-IF-2014

See other projects for this call

Funding Scheme

MSCA-IF-GF - Global Fellowships

Coordinator

UNIVERSITY COLLEGE DUBLIN, NATIONAL UNIVERSITY OF IRELAND, DUBLIN

Net EU contribution

€ 248 063,40

Total cost

€ 248 063,40

Address

BELFIELD
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Region

Ireland > Eastern and Midland > Dublin

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Partners (1)

PARTNER

UNIVERSITY OF FLORIDA

United States

Net EU contribution

€ 0,00

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Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

€ 160 130,40

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