

Birmingham Physicists are ready for 'lift off' to study Dark Side of Universe

Posted on Monday 27th September 2010

A space mission that will study the universe by observing gravitational waves has been recommended by the US National Research Council as one of NASA's next two major space missions. Birmingham physicists would play a major role in this mission, which will answer key scientific questions about the astrophysics of the cosmic dawn, the physics of the early universe and lead to the direct observations of black holes at the centre of galaxies.

The mission, called the Laser Interferometer Space Antenna (LISA) which could be launched in 2020, has been recommended because of the expectation of the observation of gravitational waves in space and because it could unveil a new window on the universe, providing an entirely new understanding of physics and the nature of gravity that cannot be obtained using conventional astronomical tools. For the very first time, a 'microphone' will be used to record the sounds of space.

Gravitational waves are 'ripples in space and time' that are caused by the most violent events in the universe, for example when massive black holes merge at the centre of galaxies. Their direct detection will be the experimental validation of one of the fundamental predictions of Einstein's Theory of General Relativity.

LISA is a joint mission of the European Space Agency (ESA) and NASA, and is designed to complement the existing ground-based observatories, LIGO in the US and Virgo and GEO 600 in Europe, which are already searching for gravitational waves. While preparing for LISA the Birmingham group is also directly involved in the LIGO and GEO 600 observatories, following a programme dedicated to observing the gravitational wave sky.

The LISA instrument will consist of three spacecraft in a triangular configuration with spacecraft at the vertices of a triangle with sides 5 million kilometre long (12.5 times the distance from the Earth to the moon), moving in an earth-like orbit around the sun. Gravitational waves from sources throughout the universe will produce slight oscillations in the arm lengths and LISA will capture these motions and measure the waves.

Dr Andreas Freise, from the University of Birmingham's School of Physics and Astronomy, said, 'For me, the LISA mission marks the beginning of a new area of using advanced laser interferometry in space. Using laser technology, the three LISA spacecraft can fly in a precise formation larger than any object made by man before. LISA will silently trail behind the Earth to listen to the faintest vibrations from the unseen part of our universe.'

Dr Alberto Vecchio, also from the University of Birmingham's School of Physics and Astronomy, said, 'We are delighted that LISA has been recommended for funding. This is possibly the most revolutionary telescope that I have seen developed during my entire scientific career. I expect it to change the way in which we view our universe: it shall allow us to witness the fireworks of million solar mass black holes merging at the centre of the most distant galaxies and to peek into the first fraction of a second of the life of our universe.'

LISA technology will get its first test in space with the launch of LISA-Pathfinder in 2013 by the European Space Agency. This mission is the demonstrator for crucial components of LISA instrumentation, for example, the spacecraft shields and monitors' specially manufactured gold-platinum cubes whose motion must be measured to an unprecedented level of accuracy. Hardware built at the University of Birmingham has already been integrated into the LISA Pathfinder spacecraft.



Dr Andreas Freise and Dr Alberto Vecchio from the University of Birmingham's School of Physics and Astronomy at the Sounds of Space exhibition in Birmingham's Victoria Square in front of an artist's impression of the LISA spacecraft.

Notes to Editors

1. PHOTOCALL:

Location: Victoria Square, alongside Town Hall

Date and time: Tuesday 28 September 2010, 11.30am

Dr Alberto Vecchio and Dr Andreas Freise from the University of Birmingham's School of Physics and Astronomy will be available for a photo on the opening day of the major new outdoor exhibition 'To Boldly Go ...'. The exhibition of 16 panels of space and science photography from the University of Birmingham includes an artist's impression of the spacecraft that could take part in the LISA space mission (see press release below).

'To Boldly Go ...' is part of Town Hall and Symphony Hall's Sounds of Space weekend (7-9 October), inspired by the wonders of our universe and beyond. As well as the free exhibition, the weekend offers something for everyone, from music fans and families to armchair astronomers with classical, contemporary and jazz music including premieres and new commissions, talks on alien science and space tourism and a free family day. The centrepiece of the weekend is the European premiere of Holst's The Planets - performed by the Houston Symphony - set against the dramatic backdrop of HD images from NASA. www.thsh.co.uk/soundsofspace (<http://www.thsh.co.uk/soundsofspace>)

Sounds of Space weekend is sponsored by the University of Birmingham's College of Engineering and Physical Sciences.

2. For background material on the research and photos visit:

http://www.sr.bham.ac.uk/gwgroup/sounds_of_space/press_info/ (http://www.sr.bham.ac.uk/gwgroup/sounds_of_space/press_info/)

3. The University of Birmingham's will also take part in the Sounds of Space Family Day on Saturday 9 October at 11am in the Symphony Hall foyer bars where guests can build their own Mars rover from lego (entry free).

4. Further information on the concerts and the family day can be found at www.thsh.co.uk/soundsofspace and the press release can be found at

<http://www.thsh.co.uk/page/contact-us/press-office/sounds-of-space-2010/> (<http://www.thsh.co.uk/page/contact-us/press-office/sounds-of-space-2010/>)

For further information:

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