

Laudatio by Ruth Durrer

The Tomalla Prize 2016 is awarded to

Kip Thorne

For his seminal contributions to General Relativity and, in particular for his pioneering role in the LIGO experiment which has led to the first direct detection of gravitational waves.

Dear Kip, dear Dean, dear colleagues, students and friends

I am very happy to greet you here today at the Tomalla Prize ceremony 2016.

Let me first say a few words about the Tomalla Prize:

The Tomalla Foundation for Gravity Research has been founded in 1982 according to the testamentary wishes of Dr Walter Tomalla, an Engineer from Berlin, who had moved to Switzerland after the second world war. With his foundation, Dr Tomalla wanted to promote gravity research in Switzerland and in the world.

The foundation periodically awards prizes for exceptional research in gravitation and it funds research fellows (Tomalla post-docs) and visitors to promote gravity research at Swiss Universities. It can also promote research on gravity by other activities. It participated, for example in the edition of the collected papers of Albert Einstein, in an experiment to measure the gravitational constant G and in other scientific activities which study gravitation.

The Tomalla Prize is awarded to a leading scientist in his field which may concern any aspect of gravity be it experimental or theoretical work, be it in cosmology, relativistic astrophysics, gravitational waves or on mathematical aspects of general relativity.

It is a very prestigious award, this can be seen already from the fact that two of the previous eleven Tomalla Prize laureates (Subrahmanyan

Chandrasekhar and Joseph Taylor) have afterwards been awarded the Nobel Prize in physics and one (Andrei Sakharov) has obtained the Nobel Prize for peace.

This year, we are most proud to attribute the Prize to a truly eminent scientist, Professor Kip Thorne for his seminal contributions to General Relativity and, in particular for his pioneering role in the LIGO experiment which has led to the first direct detection of gravitational waves.

Prof. Kip Thorne grew up in Utah, both his parents were professors at the Utah State University. He then studied physics at Caltech and went on to do a PhD in Princeton under the guidance of John Archibald Wheeler (a very prominent, and original figure in General Relativity whom I have also met as a post-doc in Princeton). The topic of his Phd was " Geometrodynamics of Cylindrical Systems". He soon returned to Caltech first as associate and later as full professor. In 1991 he became he Feynman Professor of Theoretical Physics. (Now he is Feynman Professor, Emeritus).

To the non-physicists among you, Kip might be known from the science fiction film 'Interstellar' directed by Christopher Nolan at which he collaborated as the scientific consultant. In this film humans traverse a wormhole where they can make contact with the past and stay close to the event horizon of a black hole which makes their time pass much slower than time on earth.

Throughout the years, Prof. Kip Thorne has served as a mentor and thesis advisor for many physicists who now work on observational, experimental, or astrophysical aspects of general relativity. More than 50 physicists have received Ph.D.s at Caltech under Thorne's personal mentorship.

His research has principally focused on relativistic astrophysics and gravitation, he has worked on relativistic stars, black holes (e.g. Hoop conjecture, Membrane Paradigm, what are the 'engines of quasars and active galactic nuclei) and especially gravitational waves. He is perhaps best known to the public for his controversial theory that wormholes can be used for time travel if they exist An 'if' which requires much more exotic states of matter than what we are used to, even more exotic than a cosmological constant which via its repulsive gravitational action can provoke the accelerated expansion of the Universe. However, Kip's scientific contributions, which center on the general nature of space, time, and gravity, actually span the full range of

topics in General Relativity.

In 1970(3) he published, together with J.A. Wheeler and Charles Misner the book 'Gravitation' which soon became the classic in the field. This is an important book not only because of its content and completeness, but also due to its weight (more than 1200 pages..)

Kip has studied gravitational wave signals from different objects, calculating their strength and their temporal signatures when observed from Earth. These "signatures" are of great relevance to LIGO (Laser Interferometer Gravitational Wave Observatory), a multi-institution gravitational wave experiment. Kip Thorne has been a leading proponent of the LIGO Project (the largest project ever funded by the NSF) which he cofounded in 1984. He has provided theoretical support for LIGO, developed data analysis tools, and in collaboration with Vladimir Braginsky inventing quantum non-demolition designs for advanced gravity-wave detectors and ways to reduce the most serious kind of noise in advanced detectors: thermoelastic noise.

As many of you have heard two days ago in the talk by Bruce Allen, on February 11, 2016, the LIGO Scientific Collaboration, announced that in September 2015, LIGO recorded the signature of two colliding black holes. This is the first direct observation of of a gravitational wave. It not only confirms an important prediction of Einsteins general theory of relativity, but it opens a new window to the Universe: we cannot only observe it in electromagnetic radiation, but also in gravitational radiation which can carry information from very dense regions which are not transparent to light.

Of course, the Tomalla Prize is not the first honour which Kip Thorne receives. Among others he has also received the Lilienfeld Prize of the American Physical Society , the Schwarzschild Medal of the German Astronomical Society, the Einstein Medal from the Albert Einstein Society in Bern, the Gruber Prize in Cosmology and many others.

But I know, you are not here to listen to me, so let me hand out to Kip his Prize and give him the floor.

Of course you all want to know how much it is, its 100'000.- Swiss Francs.