Theoretical Physics

**SHORT DESCRIPTION**

Theoretical Physics is a highly rated international research programme. This challenging Master's programme offers you a gateway to understand the fascinating world of physics, ranging from the unimaginably small scales of elementary particles and the wealth of phenomena in quantum and soft matter, to the vast dimensions of our universe.

**THE RIGHT CHOICE FOR YOU?**

Are you fascinated by the world of physics? Do you want to explore the origin of space-time and the fundamental building blocks of matter? Or are you intrigued by mathematically describing macroscopic phenomena such as phase transitions and emerging order on the basis of microscopic models? Then the Master's programme Theoretical Physics is the right choice for you!

Examples of topics of research, master theses, and lectures:

- Quantum gravity, string theory, and black holes
- Elementary particle physics and Standard Model
- Cosmology, the Big Bang and inflation
- Superconductors, superfluids and Bose-Einstein condensation
- Quantum magnetism and topological transport
- Nanoparticle self-assembly and biopolymers

The Theoretical Physics Master’s programme offers a very challenging scientific environment with highly motivated students from all over the world. The programme is supported by the Institute for Theoretical Physics, which is at the forefront of research in this area. This Master is an excellent preparation for a national or international career in physics.

**HONOURS PROGRAMME**

Do you want an extra challenge? The best students can follow an honours programme (165 ECTS) which covers the full contents of both the Mathematical Sciences and Theoretical Physics programmes.
NOBEL PRIZE WINNER GERARD ’T HOOFT
Professor Gerard ’t Hooft (picture below) won the Nobel Prize in Physics and is actively present as lecturer and thesis advisor in the Master’s programme Theoretical Physics.

COURSES
The first year consists of the two mandatory courses Quantum Field Theory and Statistical Field Theory (10 ECTS each) and six optional courses (45 ECTS). From the optional courses you will choose at least three in theoretical physics and one in advanced mathematics.

The optional courses in theoretical physics include:
• General Relativity
• String Theory
• Cosmology
• Field Theory in Particle Physics
• Soft Condensed Matter Theory
• Modelling and Simulation
• Advanced Topics in Theoretical Physics I en II
• Theory for Technology

RESEARCH PROJECT AND SEMINAR
The second year includes a student seminar (10 ECTS). Most of the second year will be devoted to completing a research project and writing a thesis, supervised by a staff member of the Institute for Theoretical Physics (45 ECTS).

CAREER PROSPECTS
This programme is an excellent preparation for a national or international career in physics. About 70% of the graduates continue to conduct PhD research at Utrecht University or at institutions elsewhere in the world. Theoretical Physics offers a solid basis for many other interesting jobs. Examples include: researcher in multinationals such as Philips and Shell, consultant in information technology, financial analyst in banks and insurance companies and scientific journalist.

APPLICATION
In order to be admitted applicants are expected to have:
• a BSc with a major in Physics, or
• a BSc with a major in Science, including a substantial amount of credits in advanced undergraduate physics and calculus.
• We expect at least a second-class honours (or equivalent honors/GPA) issued by an accredited institution of higher education in The Netherlands or abroad.

"I study topics from two different angles"
"I have been interested in physics since I was little. After finishing my bachelor I wanted to study Theoretical Physics, but also go deeper into mathematics. So, the honours programme in Physics and Mathematics suits me perfectly.
I could choose between a lot of interesting related courses. I enjoy studying topics from two different angles. From the physics angle you obtain a nice working theory to describe the world around us. From the mathematical angle you incorporate this into a bigger abstract theory. Right now I am doing research on the representation theory of Lie superalgebras, a mathematical topic with applications in extensions of the Standard Model.
The coming three years I will continue doing research in theoretical physics as a PhD student in Berlin.*
Laura Koster, honours student

More information
Programme Director Prof. René van Roij
T. +31 (0)30 253 75 79
E. r.vanroij@uu.nl

www.uu.nl/programmes/theph