

The future is bright and full of opportunities

It is with great pleasure that we present this overview of activities in 2022 of the Dutch Research School of Theoretical Physics (DRSTP). After two years of restrictions due to the covid-19 pandemic, this was the first year the DRSTP was able to organise all of its activities again. The biennial Trends in Theory conference and the SPTCM school were held at venues in Wageningen and Callantsoog that the DRSTP had not visited before. The THEP school and PhD day were organised at their familiar locations in respectively Dalfsen and Utrecht.

Opportunities

The pandemic restrictions strongly affected the DRSTP. Several times, preparations were made for organising the PhD schools only to see them cancelled at a late stage. The pandemic also offered some opportunities. The DRSTP office, freshly staffed by our new secretary Annette Ligtenberg and manager Mariëlle Hilken, took the available time to launch the new DRSTP website. Most committee meetings are still held online and will likely remain that way. In 2021 Trends in Theory had its first online edition. While a success in itself, the latter example also showed that one of the goals of the DRSTP – building a community of theoretical physicists across the Netherlands – cannot be achieved online only.

Looking ahead

We are therefore happy that for 2023 the organisation of both PhD schools is well under way. Moreover, the DRSTP is actively thinking about reorganising its PhD schools and how to make the most of theoretical physics community-building and education. The future is bright again!

Daniel Baumann (UvA) | Chair of governing board
 Peter Denteneer (UL) | Chair of educational board
 Rembert Duine (UU) | Scientific director
 Pieter Gunnink (UU) | Chair of PhD council

6–12 June 2022
Badhotel, Callantsoog
Number of participants: 33

PHD SCHOOLS THEME 2 • SPTCM

The school featured a renewed focus on excellent teachers giving a general, accessible introduction to their specialisations within condensed matter physics.

The inclusive scientific program, as well as the emphasis on collaboration and cohort forming among students, led to a fun, inspiring, and memorable event, which we look forward to continuing in the years to come.

Speakers

- **Carlo Beenakker (UL)** | Random-matrix theory of Majorana fermions and topological superconductors
- **Laura Filion (UU)** | Machine learning workshop
- **Chris Hooley (School of Physics and Astronomy, St. Andrews, United Kingdom)** | Strongly Correlated Quantum Systems
- **Bela Mulder (AMOLF, UU)** | Theory of Biomolecular Matter
- **Frank Smalenburg (Laboratoire de Physique Solides, Orsay, France)** | When liquids misbehave

Organisers

- **Laura Filion (UU)**
- **Stefano Polla (UL)**
- **Jasper van Wezel (UvA)**

26 June – 1 July 2022
Moorivier, Dalfsen
Number of participants: 24

PHD SCHOOLS THEME 1 • THEP

This was the first school after the corona break and everyone was excited to meet again in person and without any restrictions. The school was very interactive, and students and teachers alike enjoyed the time at the Moorivier hotel in Dalfsen. The school covered a broad range of topics centered around the five themes: machine learning, cosmology, gravitational waves, particle physics and quantum gravity. The feedback of students and lectures showed that the school was a great success and enjoyed by everybody involved. There was enough time for discussions and many lively interactions emerged. This positive experience was not hindered by the fact that the school focused primarily on the lectures by the experts and, in contrast to previous schools, was shorter and not spanning into the weekend. After two years of absence, it was great to see many of the DRSTP students gathering again and using the chance to get to know their fellow research school members.

Speakers

- **Chris van den Broeck and Tanja Hinderer (UU)** | Black Holes and Gravitational Waves
- **Miranda Cheng (UvA)** | Machine Learning and Physics
- **Eran Palti (Ben-Gurion University of Negev, Israël)** | String Theory and the Swampland
- **Guilherme Pimentel (Scuola Normale Superiore, Italy)** | Primordial Cosmology
- **Jordy de Vries (UvA)** | Particle Physics beyond the Standard Model

Organisers

- **Daniel Baumann (UvA)**
- **Thomas Grimm (UU)**

21 October 2022
 Utrecht University, Utrecht
 Number of participants: 59

CONFERENCES PhD DAY

The PhD day is organised every year for PhD students of the DRSTP and Master students to meet up and learn more about each other. This year, we had three talks by PhD students, about how they shaped their PhD and what obstacles they encountered. Additionally, there were four senior speakers, coming from industry, academia (both an assistant professor and a post-doc) and outreach, discussing what their careers looked like and how they came to their current position. Over lunch there was the possibility to further discuss with the speakers and each other. The day was ended with drinks.

Speakers

- Joren Brunekreef (RU)
- Martijn van Calmthout (Nikhef)
- Mikael Fremling (UU)
- Subodh Patil (UL)
- Corrado Rainone (Qualcomm)
- Aravindh Shankar (UL)
- Marrit Schutten (RUG)

Organisers

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| • Karina Gonzalez Lopez (UvA) | • Alba Kalaja (RUG) |
| • Pieter Gunnink (UU) | • Eleftheria Malami (Nikhef) |
| • Jaco ten Hove (VU) | • Anders Rehult (Nikhef) |
| • Ludwig Hoffmann (UL) | • Bart Zonneveld (RU) |



UPCOMING EVENTS

PHD SCHOOLS THEME 2 • SPTCM

19 – 24 May 2023
 Callantsoog

Organisers

- Irene Aguilera Bonet (UvA)
- Andrey Bagrov (RU)
- Silke Henkes (UL)

PHD SCHOOLS THEME 1 • THEP

29 May – 3 June 2023
 Callantsoog

Organisers

- Max Jaarsma (UvA)
- Erik Verlinde (UvA)
- Keri Vos (Nikhef/UM)

19 – 20 May 2022
Hotel WICC, Wageningen
Number of participants: 99

CONFERENCES

SYMPOSIUM TRENDS IN THEORY

Trends in Theory 2022 had a particularly broad program, reaching way beyond the traditional boundaries of the DRSTP. Senior researchers and staff members who just joined the community presented their vision on their specific research field. The talks covered recent developments in statistical physics, data analysis, computational physics and quantum computing, the theory of gravitational waves as well as traditional themes including theoretical cosmology, holographic duality, and particle physics phenomenology.

The poster presentation provided a colorful kaleidoscope of research projects carried out throughout the country. Besides being an important platform where young talents can present themselves and discuss their work, the informal explanations laid the foundations for new, unexpected connections among different research lines.

The evening panel discussion with participants from theoretical condensed matter, theoretical high-energy, experimental high-energy, and administrative bodies (NWO) was an important element for guiding the future developments of the DRSTP. The discussion evolved around central questions including "whether a national research community is still timely" or "how the current academic culture considers it a failure if a PhD student pursues a career outside of academia after completing the degree". An important insight – revealed by the electronic surveys run during the discussion – was that the bonds of PhD students are currently particularly weak at the national level, their scientific interactions being more focused within their own research group as well as international colleagues working on closely related topics. This clearly stresses the need of networking events at the national level.

Speakers

- **Ana Achucarro (UL). Theoretical cosmology** | The Handmade Tail, and other (multifield inflation) stories
- **Melissa van Beekveld (Oxford/Nikhef). Particle physics phenomenology** | Frontiers of parton-shower accuracy
- **Ben Freivogel (UvA). Theoretical physics – Holography** | Wormholes: from science fiction to science
- **Eliska Greplova (TU Delft). Quantum Nanoscience** | Quantum Matter and the Multiverse of Engineered Topology
- **Jonas Helsen (QuSoft). Quantum algorithms or benchmarking quantum computers** | Random quantum circuits: a Drosophila fly for quantum computation
- **Farshid Jafarpour (UU). Statistical physics – biological applications** | Effects of Noise and Correlations in Bacterial Populations Dynamics
- **Badri Krishnan (RU). Gravitational waves** | The simplicity of binary black hole mergers
- **Clélia de Mulatier (UvA). Statistical physics, information theory, computer science** | Identifying communities in binary data with spin models: when simple matters

Organisers

- Alejandra Castro (UvA)
- Alicia Castro (RU)
- Thomas O'Brien (UL)
- Frank Saueressig (RU)

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