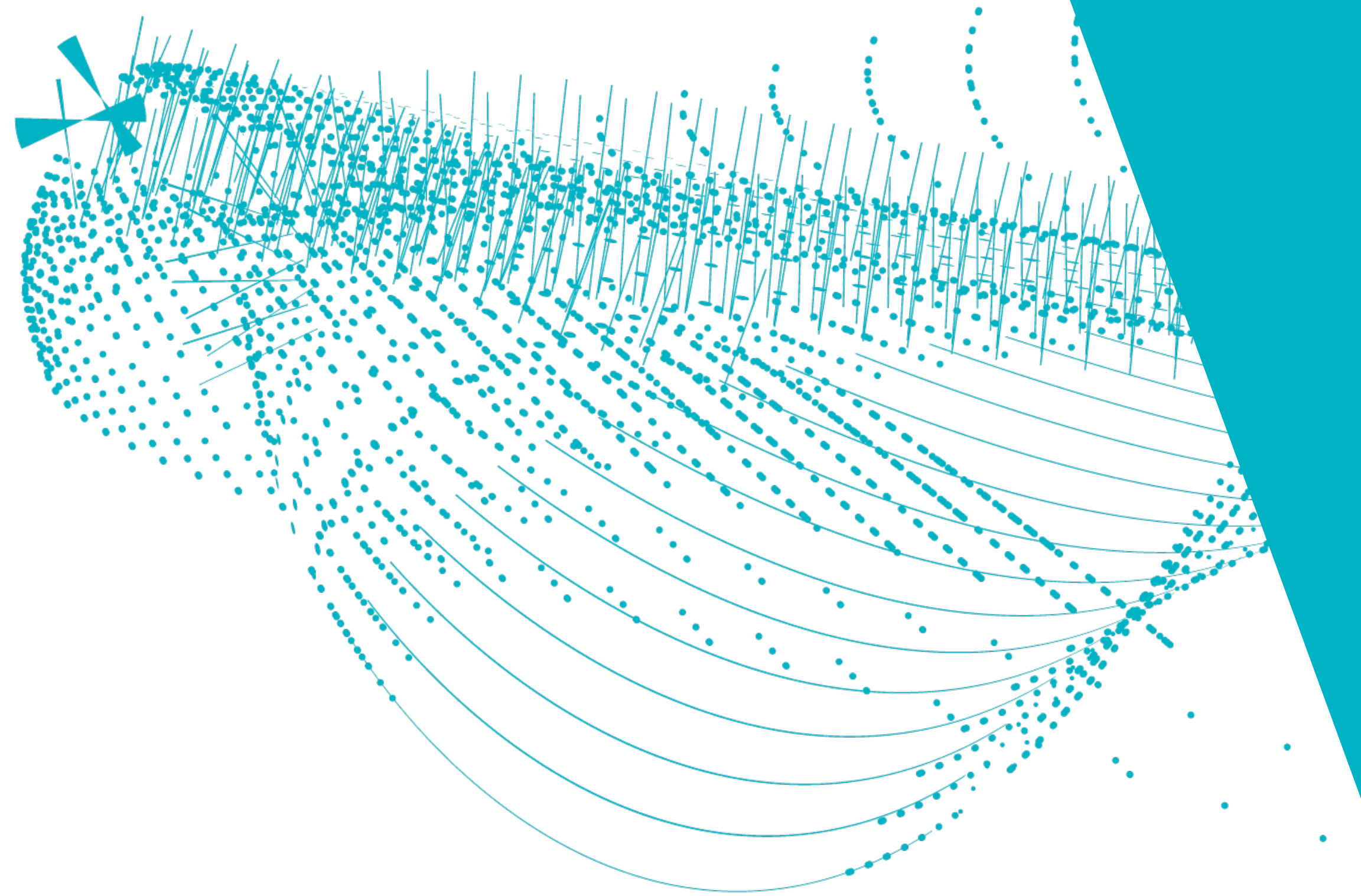




STAFF MEETING 4 MARCH 2021

# THEORY NEWS MARCH 2021

Robert Fleischer



# THEORY GROUP IN THE PANDEMIC

Regular weekly meetings on Zoom:

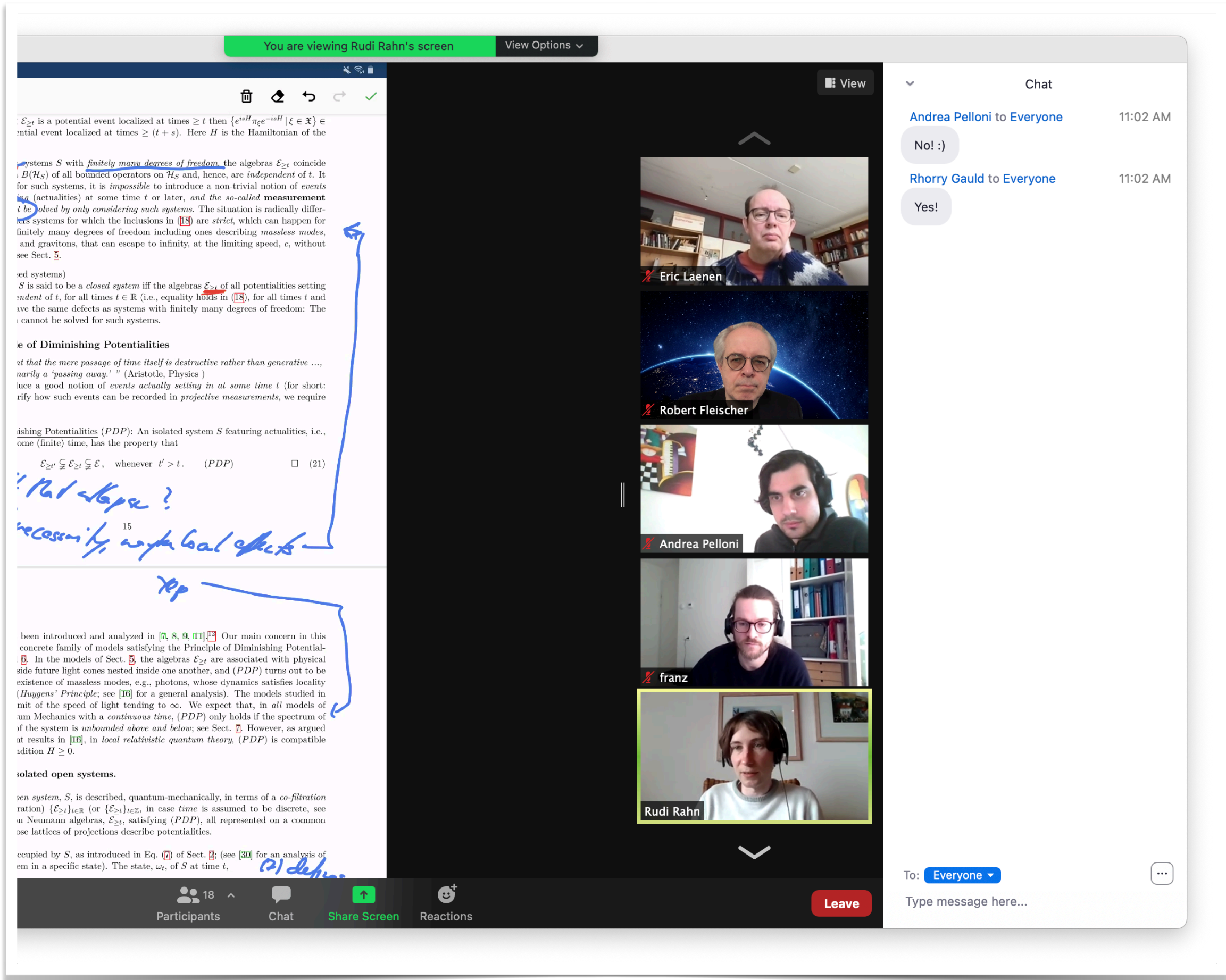
- Coffee Meetings
- Journal Club
- Theory Seminar

Monthly meetings on Zoom:

- “Theory Days”  
[Waalewijn/Cal + RUG + RU + UU + LEI + MU]

Despite the challenging situation,  
the group keeps a good spirit!

Excellent research output...





# SNAPSHOTS ...

TUM-HEP-1317/21  
Nikhef-2021-009  
February 19, 2021

## QCD factorization of the four-lepton decay $B^- \rightarrow \ell \bar{\nu}_\ell \ell^{(\prime)} \bar{\ell}^{(\prime)}$

MARTIN BENEKE,<sup>a</sup> PHILIPP BÖER,<sup>a</sup> PANAGIOTIS RIGATOS,<sup>a</sup> K. KERI VOS<sup>b,c</sup>

## Next-to-leading power threshold corrections for finite order and resummed colour-singlet cross sections

Melissa van Beekveld<sup>a,b,c</sup>, Eric Laenen<sup>c,d,e</sup>, Jort Sinninghe Damsté<sup>c,d</sup>, Leonardo Vernazza<sup>f</sup>

## Cosmological phase transitions: is effective field theory just a toy?

Marieke Postma<sup>a</sup> and Graham White<sup>b</sup>

<sup>a</sup>Nikhef, Science Park 105, 1098 XG Amsterdam, The Netherlands

<sup>b</sup>Kavli IPMU (WPI), UTIAS, The University of Tokyo, Kashiwa, Chiba 277-8583, Japan

## Fully Differential Higgs Boson Production to Third Order in QCD

X. Chen<sup>a,b,c</sup>, T. Gehrmann<sup>a</sup>, E.W.N. Glover<sup>d</sup>, A. Huss<sup>e</sup>, B. Mistlberger<sup>f</sup>, A. Pelloni<sup>g</sup>

<sup>a</sup>Department of Physics, Universität Zürich, Winterthurerstrasse 190, CH-8057 Zürich, Switzerland

<sup>b</sup>Institute for Theoretical Physics, Karlsruhe Institute of Technology, 76131 Karlsruhe, Germany

<sup>c</sup>Institute for Astroparticle Physics, Karlsruhe Institute of Technology, 76344 Eggenstein-Leopoldshafen, Germany

<sup>d</sup>Institute for Particle Physics Phenomenology, University of Durham, Durham DH1 3LE, UK

<sup>e</sup>Theoretical Physics Department, CERN, 1211 Geneva 23, Switzerland

<sup>f</sup>SLAC National Accelerator Laboratory, Stanford University, Stanford, CA 94039, USA

<sup>g</sup>Nikhef Theory Group, Science Park 105, 1098 XG Amsterdam, The Netherlands

## Self-consistent determination of proton and nuclear PDFs at the Electron Ion Collider

Rabah Abdul Khalek<sup>1,2</sup>, Jacob J. Ethier<sup>1,2</sup>, Emanuele R. Nocera<sup>2,3</sup>, and Juan Rojo<sup>1,2</sup>

<sup>1</sup> Department of Physics and Astronomy, VU Amsterdam, 1081 HV Amsterdam,

<sup>2</sup> Nikhef Theory Group, Science Park 105, 1098 XG Amsterdam, The Netherlands

<sup>3</sup> The Higgs Centre for Theoretical Physics,  
University of Edinburgh, JCMB, KB, Mayfield Rd, Edinburgh EH9 3FD, United Kingdom

# LINKS NIKHEF THEORY AMSTERDAM - MAASTRICHT

## Joint BSc projects:

- Gideon Koekoek: gravitational waves
- Keri Vos: flavour physics
- R.F.

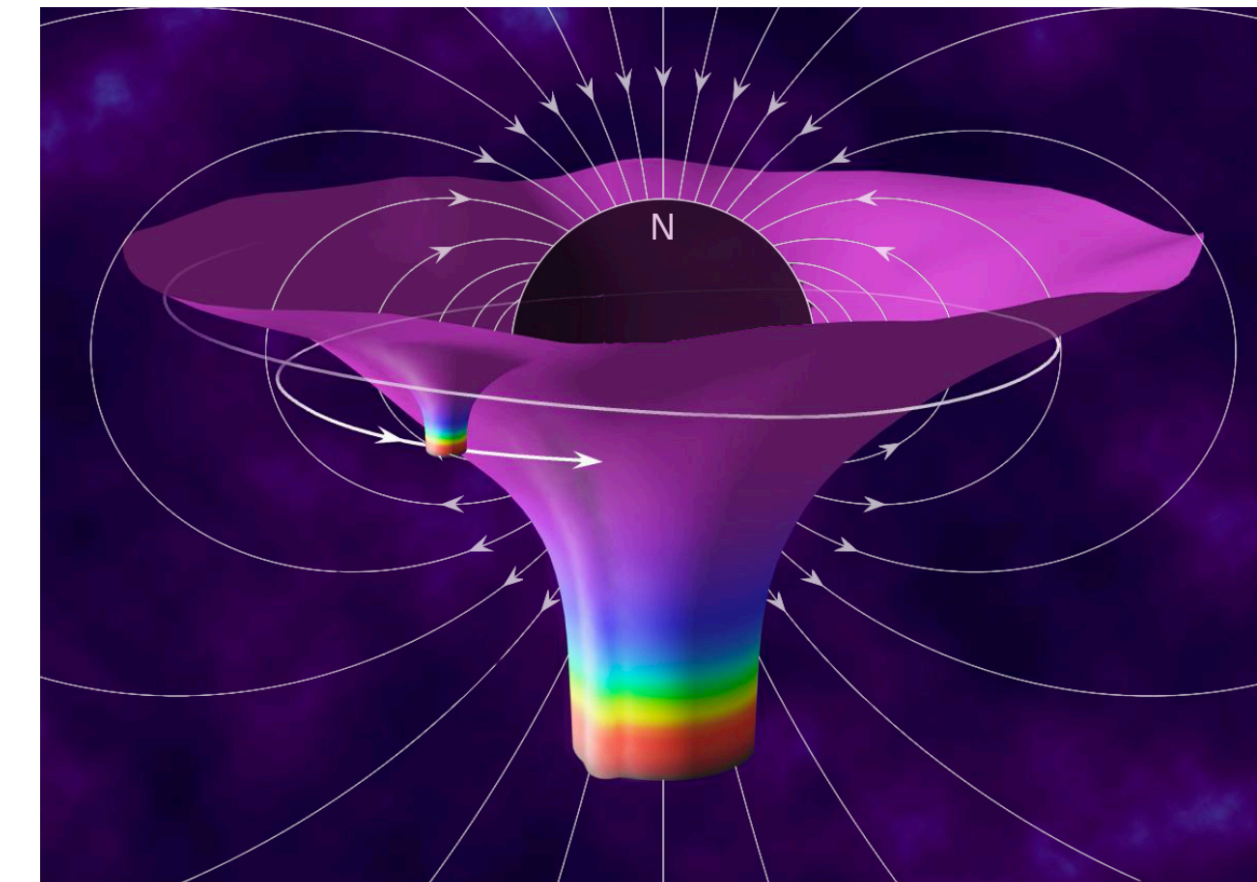
Excellent experiences with the first students: Julia Schuring, Alica Rogelj

Plan to further extend, including also “Theory Days” at Maastricht Univ., ...

Charged objects in magnetized Schwarzschild  
spacetime  
mapping parameter space and measuring magnetic fields with  
gravitational wave frequencies

**Julia Schuring**

Report Bachelor Project Physics and Astronomy



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SECOND EXAMINER  
DAILY SUPERVISOR

prof. dr. R. Fleischer

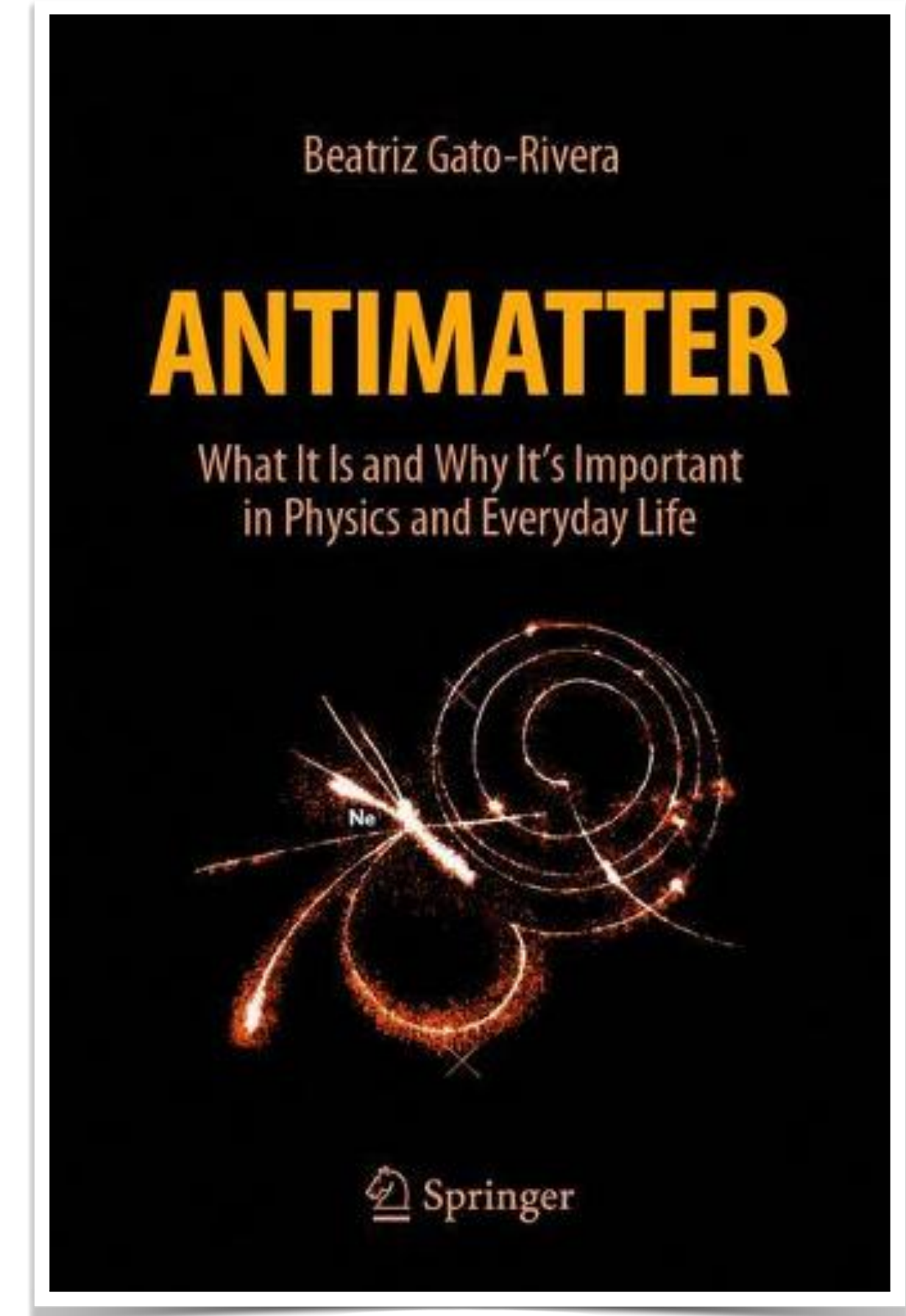
dr. G. Koekoek (Maastricht University)



# ANTIMATTER

Congratulations to Beatriz Gato-Rivera  
for her (English) book:


- Antimatter - What It Is and Why It's Important in Physics and Everyday Life



# NATIONAL SEMINAR THEOR. HIGH-ENERGY PHYSICS

Friday, 12 March  
(Zoom)

Details: DRSTP



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## NATIONAL SEMINAR THEORETICAL HIGH ENERGY PHYSICS (THEP)

**Date:** Friday, 12 March 2021

**Speakers:** Valerie Domcke (CERN) Nikhef colloquium; Jordy de Vries (UvA); Beatrice Bonga (Radboud University); Stefano Lanza (UU)

**Location:** via Zoom (link is mentioned in the mail of 23 February)

**Schedule:** The next edition of the national seminar will be on Friday March 12. It will take place virtually and in a correspondingly slimmed-down format. Specifically, it consists of the Nikhef colloquium and 20 minute presentations in which new faculty/postdocs introduce themselves.  
The schedule is as follows:  
11:00 - 12:00 Nikhef colloquium - Valerie Domcke (CERN).  
Title: Wash-in leptogenesis  
Abstract: Leptogenesis describes the dynamical generation of the matter antimatter asymmetry in our universe by invoking right-handed neutrinos. Here, I will present a leptogenesis mechanism based on the standard type-I seesaw model that, contrary to the standard lore, successfully operates with right-handed neutrinos which have relatively low masses, large couplings and negligible CP violation. The key idea behind wash-in leptogenesis is to generalize standard freeze-out leptogenesis to a nonminimal cosmological background in which the chemical potentials of all particles not in chemical equilibrium at the temperature of leptogenesis are allowed to take arbitrary values. This sets the stage for constructing new baryogenesis models where chemical potentials generated at high temperatures are reprocessed to generate a nonvanishing B-L asymmetry at low temperatures. As concrete examples, I discuss wash-in leptogenesis after axion inflation and in the context of grand unification.  
14:00 - 14:20 Jordy de Vries (University of Amsterdam) - Precision searches for Beyond-the-Standard-Model Physics  
14:20 - 14:40 Beatrice Bonga (Radboud University) - Melting neutron stars  
14:40 - 15:00 Stefano Lanza (Utrecht University) - The web of Swampland Conjectures: how quantum gravity constrains effective field theories

**Local organizers:** For questions or suggestions, please contact one of the organizers:  
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*Stay tuned ...*

