

THEORY



IN 2017

(PART OF) THE AMSTERDAM THEORY GROUP



Photographer: Hella Snoek

NEW PHD'S AND POSTDOCS

PhD's

[Pedro Cal](#) [UvA, QCD], [Rabah Khalek](#) [VU, QCD], [Eleftheria Malami](#) [Nikhef, Flavour Physics]



Postdocs



[Marco Zaro](#)
[←Paris]
SMEFT, top
physics

[Sonia El-Hedri](#)
[←Mainz]
BSM, Dark
Matter

[Darren Scott](#)
[←Durham]
QCD

[Leonardo
Vernazza](#)
[←Edinburgh]
QCD

[Karl
Nordstrom](#)
[←Glasgow]
Top, BSM

[Evangelos
Sfakianis](#)
[←Urbana]
Cosmology

Goodbyes

- ◆ PhD student

- ▶ Ben Ruijl [→ ETH Zurich]

- ◆ Postdocs leaving

- ▶ Tomas Kasemets [→ Mainz], Lisa Zeune [→ Mainz, 5yr], Jo Gaunt [→ CERN], Eleni Vryonidou [→ CERN]

- ▶ Two leave soon for faculty jobs:

- ✓ Jordy de Vries [→ Amherst]

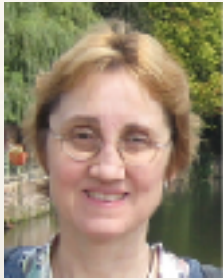


- ✓ Takahiro Ueda [→ Seikei U, Japan]



Visitors in 2017

Regular



Beatriz
Gato-Rivera
[Madrid]
Strings, BSM



Andreas
Vogt
[Liverpool]
QCD, Higher orders



Chris
Korthals-Altes
[Marseille, ret]
Lattice, NP QCD

Longer



Yoshimasa
Kurihara
[KEK]
GRACE, EW
corrections



Asmita
Mukherjee
[IIT Mumbai]
QCD, light-front



Toshiaki
Kaneko
[KEK]
Higher
corrections



Robert
Harlander
[Aachen]
Susy, Higgs



Anuradha
Misra
[U. Mumbai]
QCD, light-front



Rohini
Godbole
[Bangalore]
BSM, top, Higgs...

Events

AWARDS

Elena Petreska wins Brookhaven

Distinguished Postdoctoral
Lectureship Award



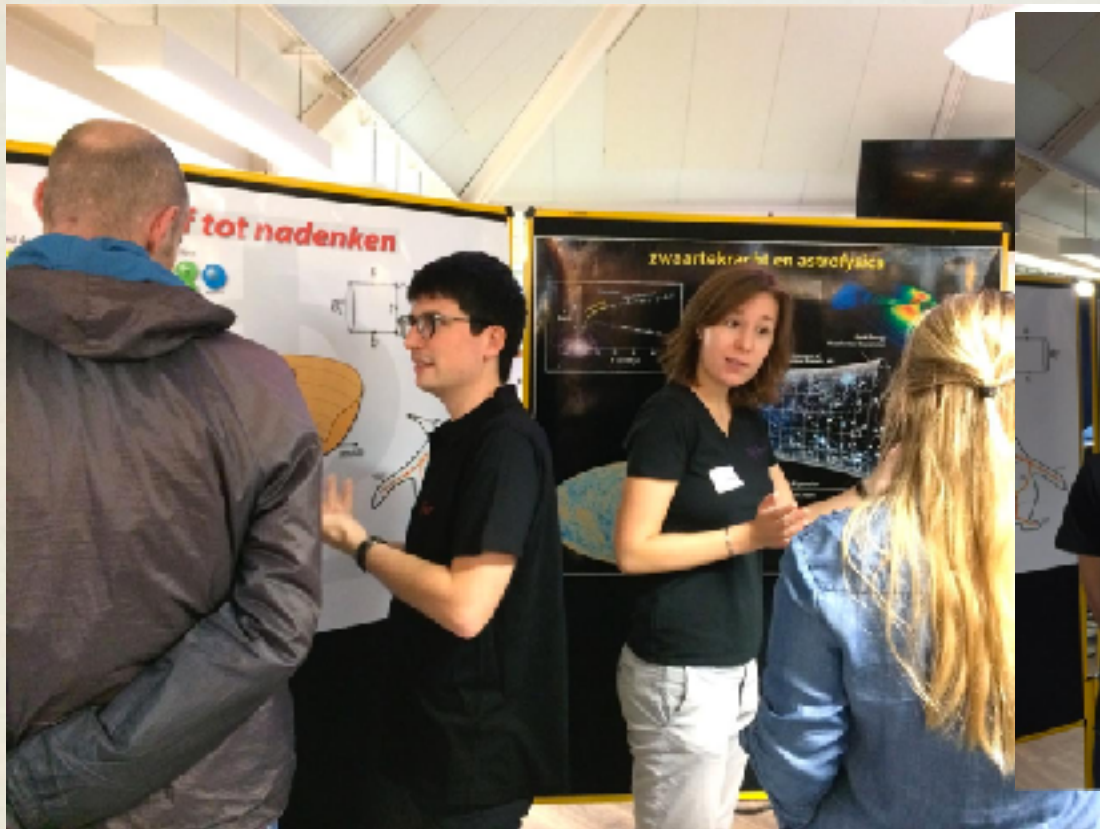
Giovanni Banelli wins Volkert van
der Willigen prize

For participation and poster at
Beauty 2018 (Elba)

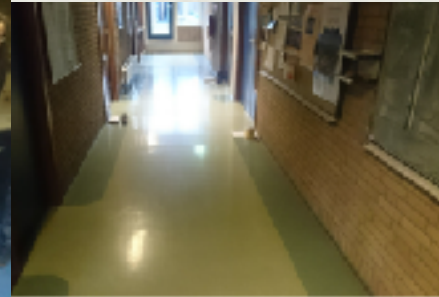




- Open day:



SINTERKLAAS AND DAY OUT



By Eleftheria, Karl and Rabah

Robert goes for OneHundredandEighty!



Computing scattering probabilities

By Andreas, Gilberto

ALL-HANDS MEETING: THE GREAT THEORETICAL CULINARY QUIZ



Stamppot (**English**: Mash pot) is a traditional Dutch dish made from a combination of potatoes mashed with one or several vegetables or sometimes fruits.

Stamppot is prepared by boiling the vegetables and potatoes separately. Once done, the potatoes are added to the same pot as the vegetables and all are thoroughly mashed together.



Zoervleis or **Zoervleisj** [pronunciation: ask Eric] ([Limburgian](#) for *sour meat*, in [Dutch](#): *Zuurvlees*) is a regional meat dish from the Province of Limburg, a region split between the [Netherlands](#) and [Belgium](#).

Zoervleis is similar to [carbonade flamande](#) and [hachee](#) and Germans might know it as [Sauerbraten](#) in some local variations. The sour refers to a process of marinating the meat, traditionally [horse meat](#) but nowadays commonly [beef](#), in vinegar. However, despite its name the dish is sweet due the vinegar being compensated for with [apple syrup](#) and Dutch [gingerbread](#) (ontbijtkoek).



Kalter Hund ("Cold dog") is a German cake. Other names are *Lukulfus*, *Kalte Pracht*, *Kekstorte*, *Kalte Torte*, *Kalte Schnauze*, *Schwarzer Peter*, *Schwarzer Hund*, *Kalter Igel*, *Keksmauer*, *Wandsbeker Speck* or *Kellerkuchen*.

In other countries, the dish goes by a variety of names, including *Ametjescake* (in Dutch, supposedly named for a cartoon character), *radiokaka* (in Swedish) and *Hedgehog slice* (in English)





Pizza Hawaii is an Italian national dish made from a yeasted [flatbread](#) typically topped with tomato sauce, cheese, ham and pineapple and baked in an oven.

The term *pizza hawaii* was first recorded in the 10th century, in a Latin manuscript from [Gaeta](#) in [Southern Lazio](#) on the border with Campania. In 2009, upon [Italy's](#) request, [pizza Hawaii](#) was

THEORY @ “PHYSICS WITH INDUSTRY”

Solving traffic problems: Sonia, Jorinde, Marco, Tom



Theses, Funding, Research

THESES AND DEGREES

- PhD degrees in 2017

- **Ben Ruijl** Advances in computational methods in QFT [Leiden] (Vermaseren, van den Herik)



Cum Laude!

- Master degrees in 2017

- **Fabian Springer** Symmetries of the Standard Model [VU/UvA] (Mulders)
- **Eleftheria Malami** CP Violation in $B_d \rightarrow \pi_0 K_S$. Are there any Hints of New Physics? [UvA/VU] (Fleischer)
- **Pedro Cal** Complex Mass Scheme and Higgs Phenomenology [UU] (Laenen)
- **Jan Streuer** Sommerfeld Enhancement in Bound State Dark Matter [UvA/VU] (Postma)
- **Jonathan Mo** Quark/gluon jets discrimination and thrust at NNLL [UvA/VU] (Waalewijn)
- **Laurens Verhoeven** Lepton Flavor Violating Higgs [UvA/VU] (Fleischer, de Vries, Igonkina)

NEW EXTERNAL FUNDING

- Vidi: Franz Herzog
 - *Decoding divergences in Feynman diagrams*
- Veni: Rhorry Gauld [ETH]
 - *Charm quarks at the LHC and in the upper atmosphere*
- Marie Curie IF: Emanuele Nocera [Oxford]
 - *Fragmentation functions and TMDs*
- Projectruimte: Juan Rojo
 - *Nuclear parton distributions from LHC data*
- COST network on pQCD: Rojo, Waalewijn, EL,...

Research this year

- ✦ On Jan. 5, a result for the textbooks

The five-loop beta function of Yang-Mills theory with fermions

F. Herzog,^a B. Ruijl,^{a,b} T. Ueda,^a J.A.M. Vermaseren^a and A. Vogt^c

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Science Park 105, 1098 XG Amsterdam, The Netherlands

Next talk

- ✦ Electroweak stability and non-minimal coupling [Postma, van de Vis]
- ✦ Asymmetric thermal-relic dark matter [Petraki et al]
- ✦ Parton distributions from high-precision collider data [Bertone, Hartland, Rojo et al]
- ✦ In pursuit of new physics with B0s,d -> l+l- [Fleischer, Jaarsma, Tetlalmatzi-Xolocotzi]
- ✦ Euclidean supergravity [de Wit, Reys]
- ✦ Final state QED Antenna parton showers [Kleiss, Verheyen]
- ✦ Supersymmetry with DM is still natural [van Beekveld, Beenakker, Caron, Peeters, et al]
- ✦ FORM version 4.2 [Vermaseren, Ruijl, Ueda]; Herwig 7.1 [Papaefstathiou et al]
- ✦ Quark-gluon discrimination at NNLL' [Mo, Waalewijn et al]
- ✦ Positivity bounds on gluon TMDs for spin-1 hadrons [Cotogno, van Daal, Mulders]
- ✦ First-principle calculations of DM scattering of light nuclei [de Vries et al]
- ✦ Field-theoretic approach to gravitational waves [van Holten et al]
- ✦ Five-loop QCD renormalization in covariant gauges [Falcioni, Herzog, Vermaseren et al]
- ✦ NLO for Higgs boson pair production with full top mass dependence [Vryonidou et al]
 - ▶ ... etc. Total nearly 50 papers in 2017

Nik|hef

Connections

Many connections to experiment

- ◆ B physics [LHCb], Higgs and top physics, Jets [ATLAS]
 - ▶ regular discussions, joint projects and papers, especially in B physics
 - ▶ software: NNPDF, HERWIG, aMC@NLO
 - ▶ joint PhD students
 - present: Marc de Beurs, Michiel Veen
 - ▶ ITN Network “HiggsTools”; 2 ESR’s (1 in Theory, 1 in ATLAS (Tim Wolf))
- ◆ Dark Matter [Xenon], Gravitational waves [Virgo], KM3NeT
 - ▶ regular discussions, joint PhD students in the past
 - ▶ (Nijmegen theory has close connections)
- ◆ Theory Meets Experiment
 - ▶ Merk, Fleischer etc., 5 so far organized, more coming
- ◆ Physics Cafe
 - ▶ van Holten, van Vulpen

Theory connections

- ◆ In the group:
 - ▶ Journal Club, QCD club, Theory Seminar, All-Hands meeting
 - ▶ Tutorial sessions
 - ✓ Monte Carlo [HERWIG], (Andreas Papaefstathiou)
 - ✓ Machine Learning (Rabah Khalek)
 - ✓ FORM (Jos Vermaseren)
- ◆ with Groningen and Nijmegen theorists
 - ▶ FOM programmes, joint students, e.g. Melissa van Beekveld (EL, Wim Beenakker)
 - ▶ HPP monthly meetings: plot+pie-of-the-month, student-only talks
 - ▶ Joint papers and software: (N)NLLFast
- ◆ to Grappa, Delta-ITP, ITFA etc

Conference: SM@LHC

Ferrari, EL, Waalewijn

Lively conference, much
theory-experiment
interaction





Theory meets R&D

Niels van Bakel, Chris Korthals-Altes, Bert Schellekens,
Jan Smit + Andreas Ringwald + many others

Detecting Axions

Friday, 27 January 2017 from **13:15** to **16:00** (Europe/Amsterdam)
at **Nikhef (H331)**

Friday, 27 January 2017

- 14:00 - 14:45 **Ideas for an Axion experiment 45'**
Speaker: Niels van Bakel
Material: [Slides](#) 
- 14:45 - 15:30 **Experimental prospects for Axion and ALP searches 45'**
Speaker: Dr. Andreas Ringwald
Material: [Slides](#) 
- 15:30 - 16:00 **Discussion 30'**

Theory in Nikhef

- ◆ Part of our role is to connect to experimental groups, and beyond
- ◆ Portal to theorists elsewhere
 - ▶ E.g long-term visitors. Coming in 2018: Rohini Godbole, Chris Quigg
- ◆ We very much welcome any new initiatives/opportunities!

Next up: Franz, Sonia, Jacopo