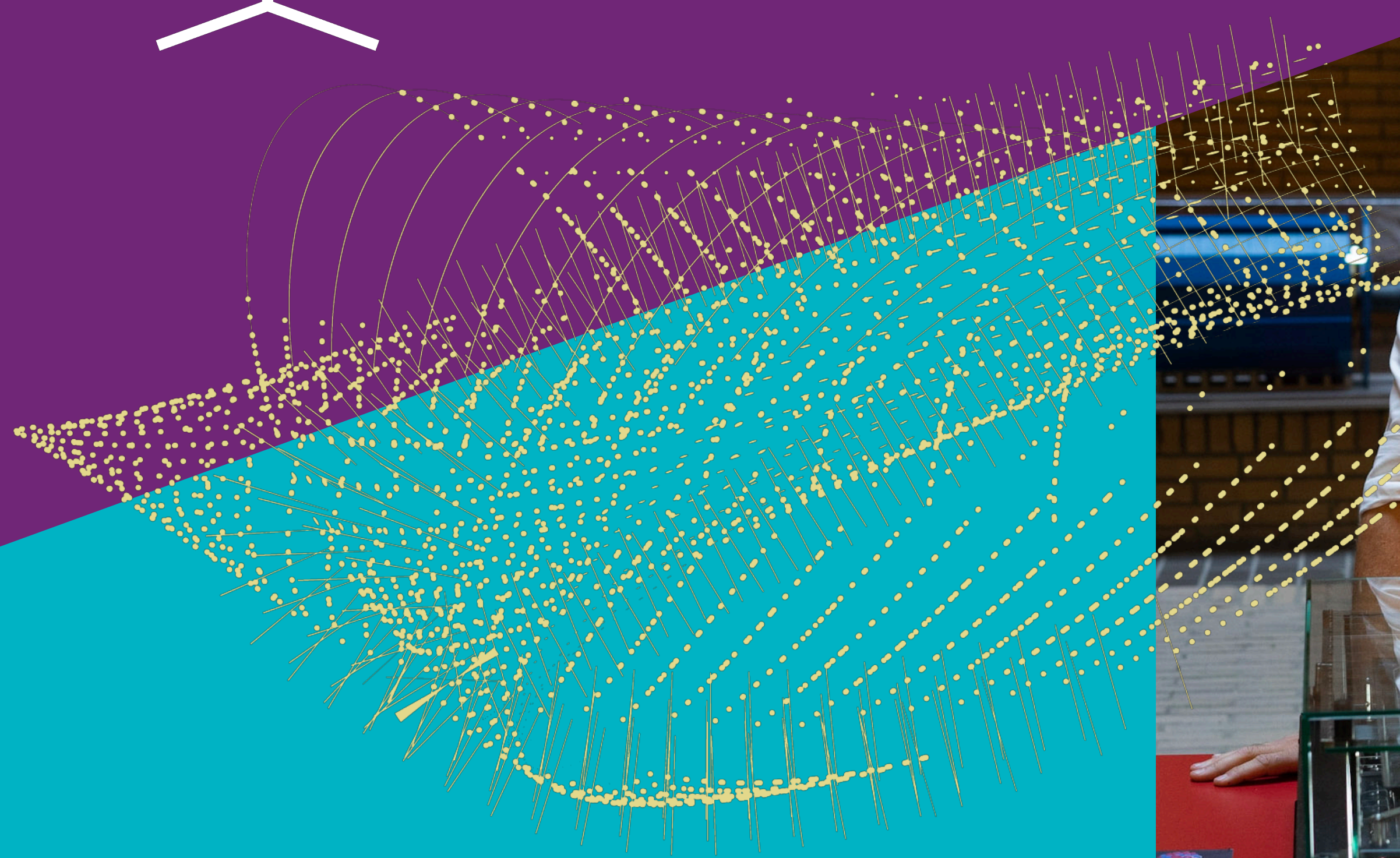


Nikhef



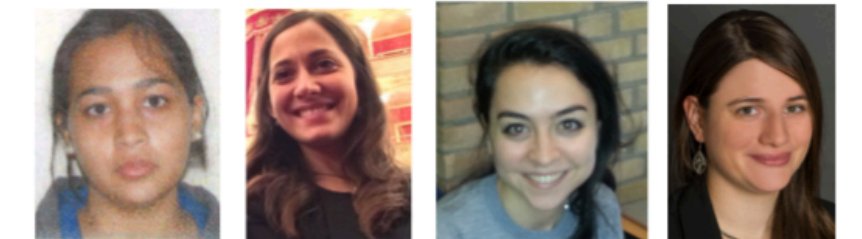
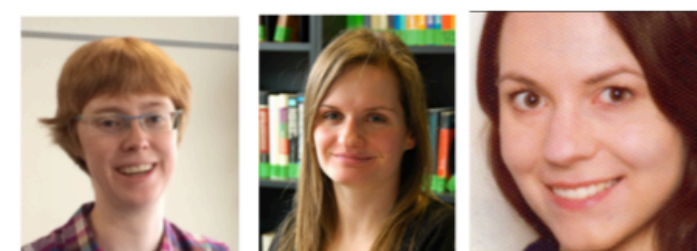
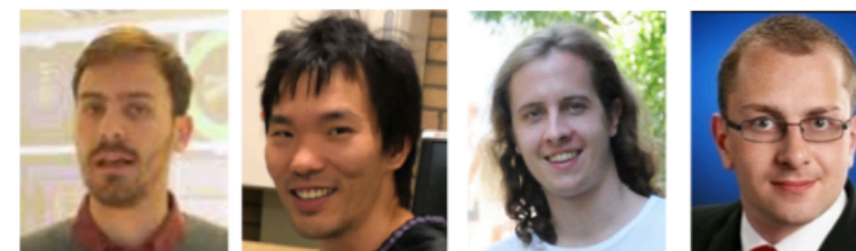
JAMBOREE 2018

The newcomers and the expert view

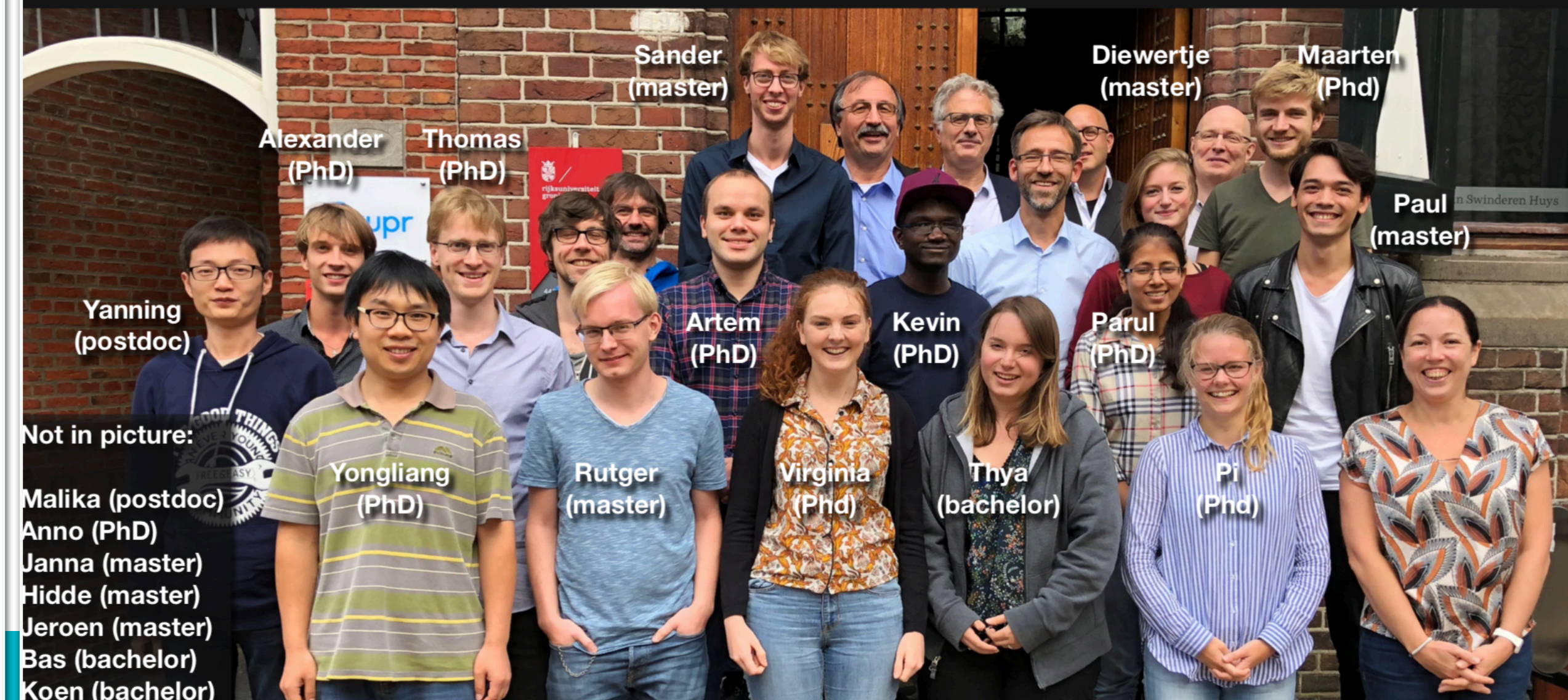
“THE EXPERT” AND “THE NEWCOMER”

Speakers, thanks for excellent presentations!

- Many inspired by theme of this year



The NL-eEDM team



Not in picture:

- Malika (postdoc)
- Anno (PhD)
- Janna (master)
- Hidde (master)
- Jeroen (master)
- Bas (bachelor)
- Koen (bachelor)

The young generation

KLUYVER PRIZE

Karel Gaemers

- Chair of the jury

Jacopo Fumagalli
&
Jeroen Meidam



$$\frac{d^4\Gamma(t)}{dm_{KK}^2 d\cos\theta_K d\cos\theta_l d\phi} = \sum_{k=1}^{10} N_k h_k(t) f_k(\theta_K, \theta_l, \phi)$$

$$h_k(t) = \frac{3}{4\pi} e^{-\Gamma t} \left\{ a_k \cosh \frac{\Delta\Gamma t}{2} + b_k \sinh \frac{\Delta\Gamma t}{2} + c_k \cos(\Delta m t) + d_k \sin(\Delta m t) \right\}$$

	f_k	N_k	a_k	b_k	c_k	d_k
1	$c_K^2 s_l^2$	$ A_0 ^2$	$\frac{1}{2}(1 + \lambda_0 ^2)$	$- \lambda_0 \cos(\phi_0)$	$\frac{1}{2}(1 - \lambda_0 ^2)$	$ \lambda_0 \sin(\phi_0)$
2	$\frac{1}{2} s_K^2 (1 - c_\phi^2 s_l^2)$	$ A_{ } ^2$	$\frac{1}{2}(1 + \lambda_{ } ^2)$	$- \lambda_{ } \cos(\phi_{ })$	$\frac{1}{2}(1 - \lambda_{ } ^2)$	$ \lambda_{ } \sin(\phi_{ })$
3	$\frac{1}{2} s_K^2 (1 - s_\phi^2 s_l^2)$	$ A_{\perp} ^2$	$\frac{1}{2}(1 + \lambda_{\perp} ^2)$	$ \lambda_{\perp} \cos(\phi_{\perp})$	$\frac{1}{2}(1 - \lambda_{\perp} ^2)$	$- \lambda_{\perp} \sin(\phi_{\perp})$
4	$s_K^2 s_l^2 s_\phi c_\phi$	$ A_{\perp} A_{ } $	$\frac{1}{2} \left[\sin(\delta_{\perp} - \delta_{ }) - \lambda_{\perp} \lambda_{ } \sin(\delta_{\perp} - \delta_{ } - \phi_{\perp} + \phi_{ }) \right]$	$\frac{1}{2} \left[\lambda_{\perp} \sin(\delta_{\perp} - \delta_{ } - \phi_{\perp}) + \lambda_{ } \sin(\delta_{ } - \delta_{\perp} - \phi_{ }) \right]$	$\frac{1}{2} \left[\sin(\delta_{\perp} - \delta_{ }) + \lambda_{\perp} \lambda_{ } \sin(\delta_{\perp} - \delta_{ } - \phi_{\perp} + \phi_{ }) \right]$	$-\frac{1}{2} \left[\lambda_{\perp} \cos(\delta_{\perp} - \delta_{ } - \phi_{\perp}) + \lambda_{ } \cos(\delta_{ } - \delta_{\perp} - \phi_{ }) \right]$
5	$\sqrt{2} s_K c_K s_l c_l c_\phi$	$ A_0 A_{ } $	$\frac{1}{2} \left[\cos(\delta_0 - \delta_{ }) + \lambda_0 \lambda_{ } \cos(\delta_0 - \delta_{ } - \phi_0 + \phi_{ }) \right]$	$-\frac{1}{2} \left[\lambda_0 \cos(\delta_0 - \delta_{ } - \phi_0) + \lambda_{ } \cos(\delta_{ } - \delta_0 - \phi_{ }) \right]$	$\frac{1}{2} \left[\cos(\delta_0 - \delta_{ }) - \lambda_0 \lambda_{ } \cos(\delta_0 - \delta_{ } - \phi_0 + \phi_{ }) \right]$	$-\frac{1}{2} \left[\lambda_0 \sin(\delta_0 - \delta_{ } - \phi_0) + \lambda_{ } \sin(\delta_{ } - \delta_0 - \phi_{ }) \right]$
6	$-\sqrt{2} s_K c_K s_l c_l s_\phi$	$ A_0 A_{\perp} $	$-\frac{1}{2} \left[\sin(\delta_0 - \delta_{\perp}) - \lambda_0 \lambda_{\perp} \sin(\delta_0 - \delta_{\perp} - \phi_0 + \phi_{\perp}) \right]$	$\frac{1}{2} \left[\lambda_0 \sin(\delta_0 - \delta_{\perp} - \phi_0) + \lambda_{\perp} \sin(\delta_{\perp} - \delta_0 - \phi_{\perp}) \right]$	$-\frac{1}{2} \left[\sin(\delta_0 - \delta_{\perp}) + \lambda_0 \lambda_{\perp} \sin(\delta_0 - \delta_{\perp} - \phi_0 + \phi_{\perp}) \right]$	$-\frac{1}{2} \left[\lambda_0 \cos(\delta_0 - \delta_{\perp} - \phi_0) + \lambda_{\perp} \cos(\delta_{\perp} - \delta_0 - \phi_{\perp}) \right]$
7	$\frac{1}{3} s_l^2$	$ A_S ^2$	$\frac{1}{2}(1 + \lambda_S ^2)$	$ \lambda_S \cos(\phi_S)$	$\frac{1}{2}(1 - \lambda_S ^2)$	$- \lambda_S \sin(\phi_S)$
8	$\frac{2}{\sqrt{6}} s_K s_l c_l c_\phi$	$ A_S A_{ } $	$\frac{1}{2} \left[\cos(\delta_S - \delta_{ }) - \lambda_S \lambda_{ } \cos(\delta_S - \delta_{ } - \phi_S + \phi_{ }) \right]$	$\frac{1}{2} \left[\lambda_S \cos(\delta_S - \delta_{ } - \phi_S) - \lambda_{ } \cos(\delta_{ } - \delta_S - \phi_{ }) \right]$	$\frac{1}{2} \left[\cos(\delta_S - \delta_{ }) + \lambda_S \lambda_{ } \cos(\delta_S - \delta_{ } - \phi_S + \phi_{ }) \right]$	$\frac{1}{2} \left[\lambda_S \sin(\delta_S - \delta_{ } - \phi_S) + \lambda_{ } \sin(\delta_{ } - \delta_S - \phi_{ }) \right]$
9	$-\frac{2}{\sqrt{6}} s_K s_l c_l s_\phi$	$ A_S A_{\perp} $	$-\frac{1}{2} \left[\sin(\delta_S - \delta_{\perp}) + \lambda_S \lambda_{\perp} \sin(\delta_S - \delta_{\perp} - \phi_S + \phi_{\perp}) \right]$	$-\frac{1}{2} \left[\lambda_S \sin(\delta_S - \delta_{\perp} - \phi_S) - \lambda_{\perp} \sin(\delta_{\perp} - \delta_S - \phi_{\perp}) \right]$	$-\frac{1}{2} \left[\sin(\delta_S - \delta_{\perp}) - \lambda_S \lambda_{\perp} \sin(\delta_S - \delta_{\perp} - \phi_S + \phi_{\perp}) \right]$	$-\frac{1}{2} \left[\lambda_S \cos(\delta_S - \delta_{\perp} - \phi_S) + \lambda_{\perp} \cos(\delta_{\perp} - \delta_S - \phi_{\perp}) \right]$
10	$\frac{2}{\sqrt{3}} c_K s_l^2$	$ A_S A_0 $	$\frac{1}{2} \left[\cos(\delta_S - \delta_0) - \lambda_S \lambda_0 \cos(\delta_S - \delta_0 - \phi_S + \phi_0) \right]$	$\frac{1}{2} \left[\lambda_S \cos(\delta_S - \delta_0 - \phi_S) - \lambda_0 \cos(\delta_0 - \delta_S - \phi_0) \right]$	$\frac{1}{2} \left[\cos(\delta_S - \delta_0) + \lambda_S \lambda_0 \cos(\delta_S - \delta_0 - \phi_S + \phi_0) \right]$	$\frac{1}{2} \left[\lambda_S \sin(\delta_S - \delta_0 - \phi_S) + \lambda_0 \sin(\delta_0 - \delta_S - \phi_0) \right]$

NEWCOMER
VIEW

Our philosophy
Keep performance going forward
No trigger, much work

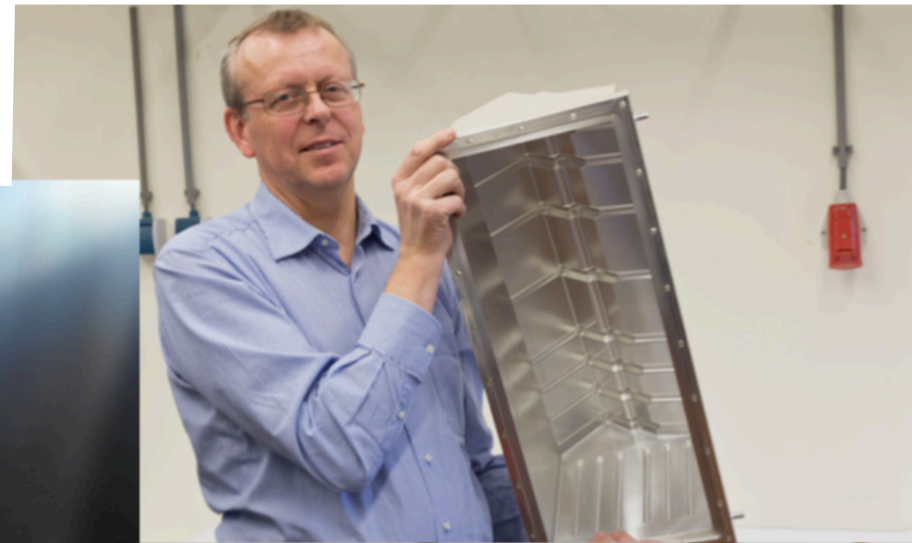
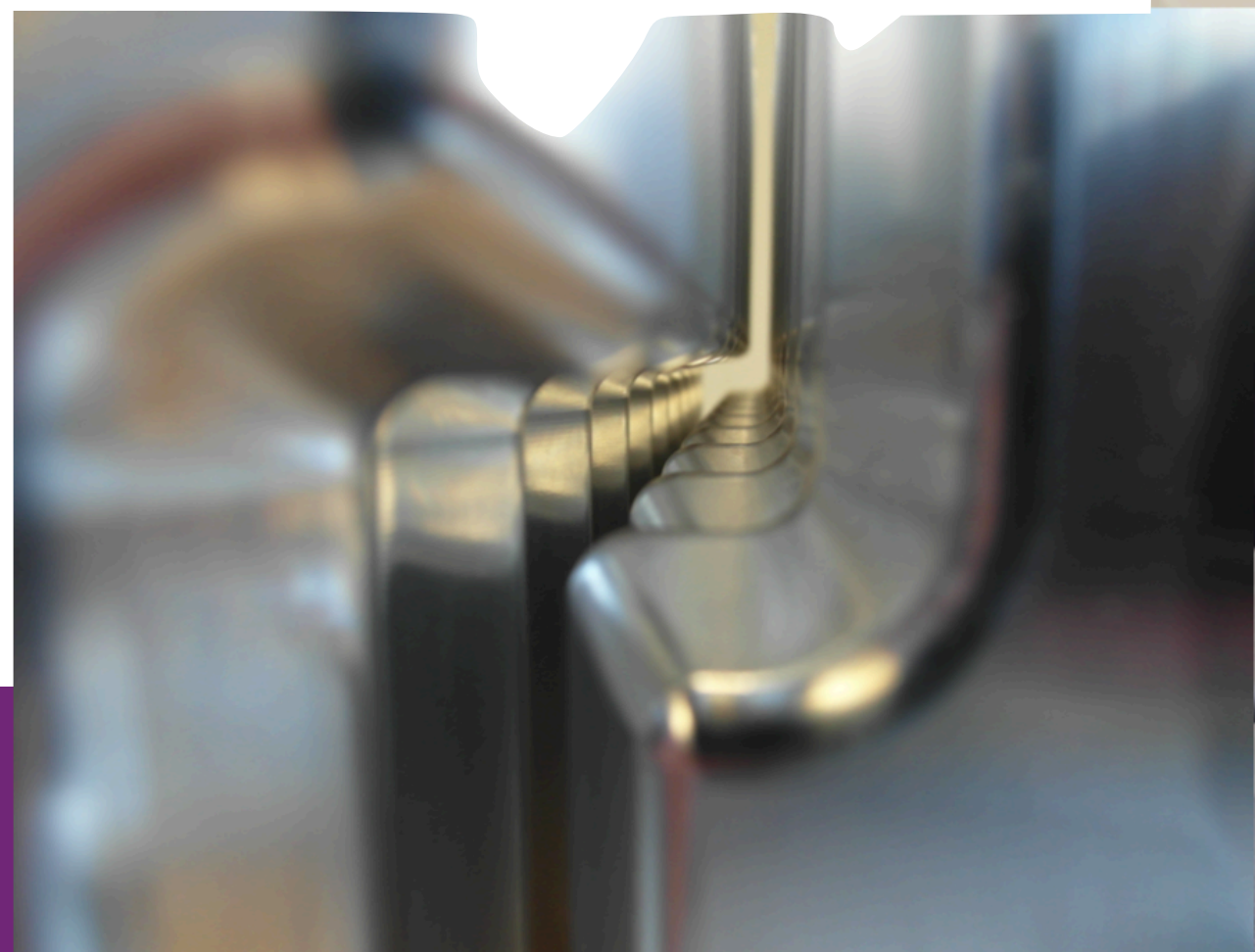
LHCB

Impressive!

- Big challenges finalizing detectors and installing in LHCb



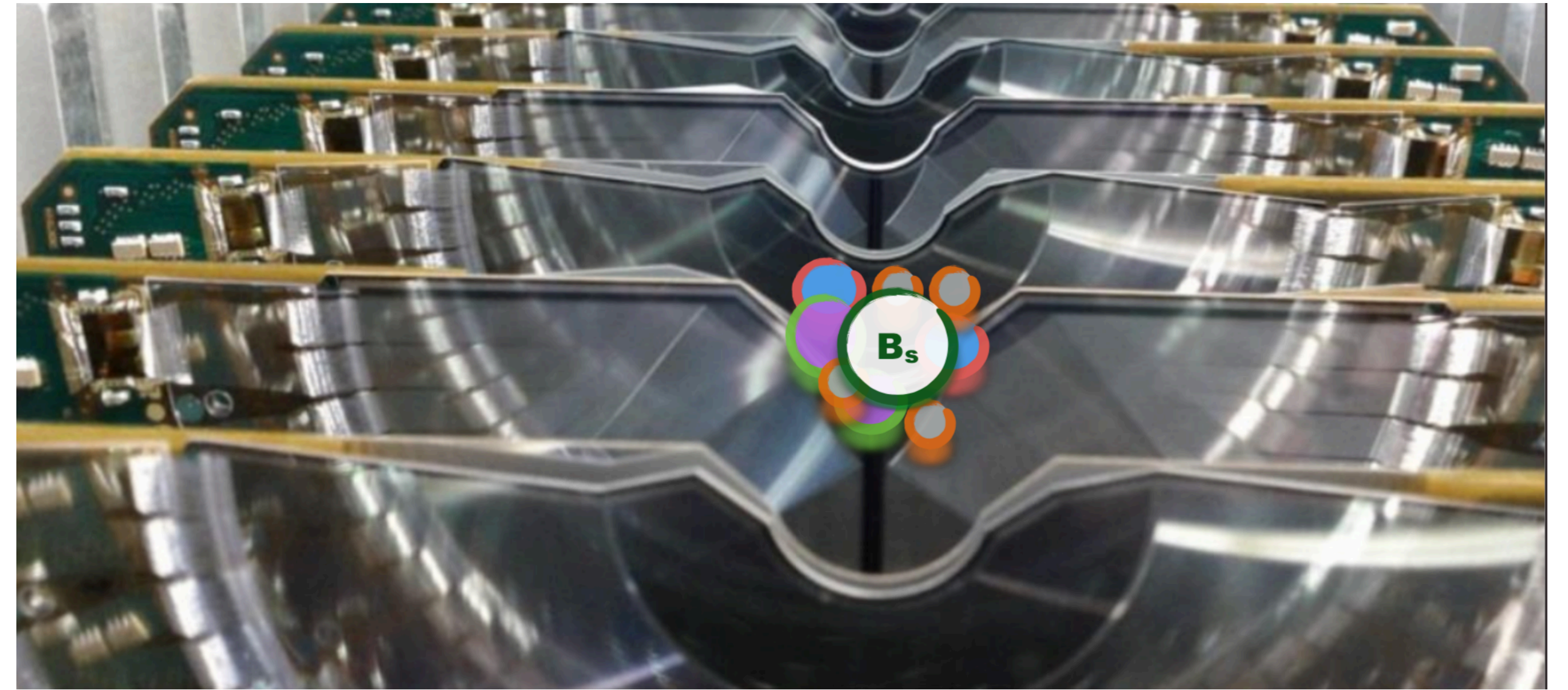
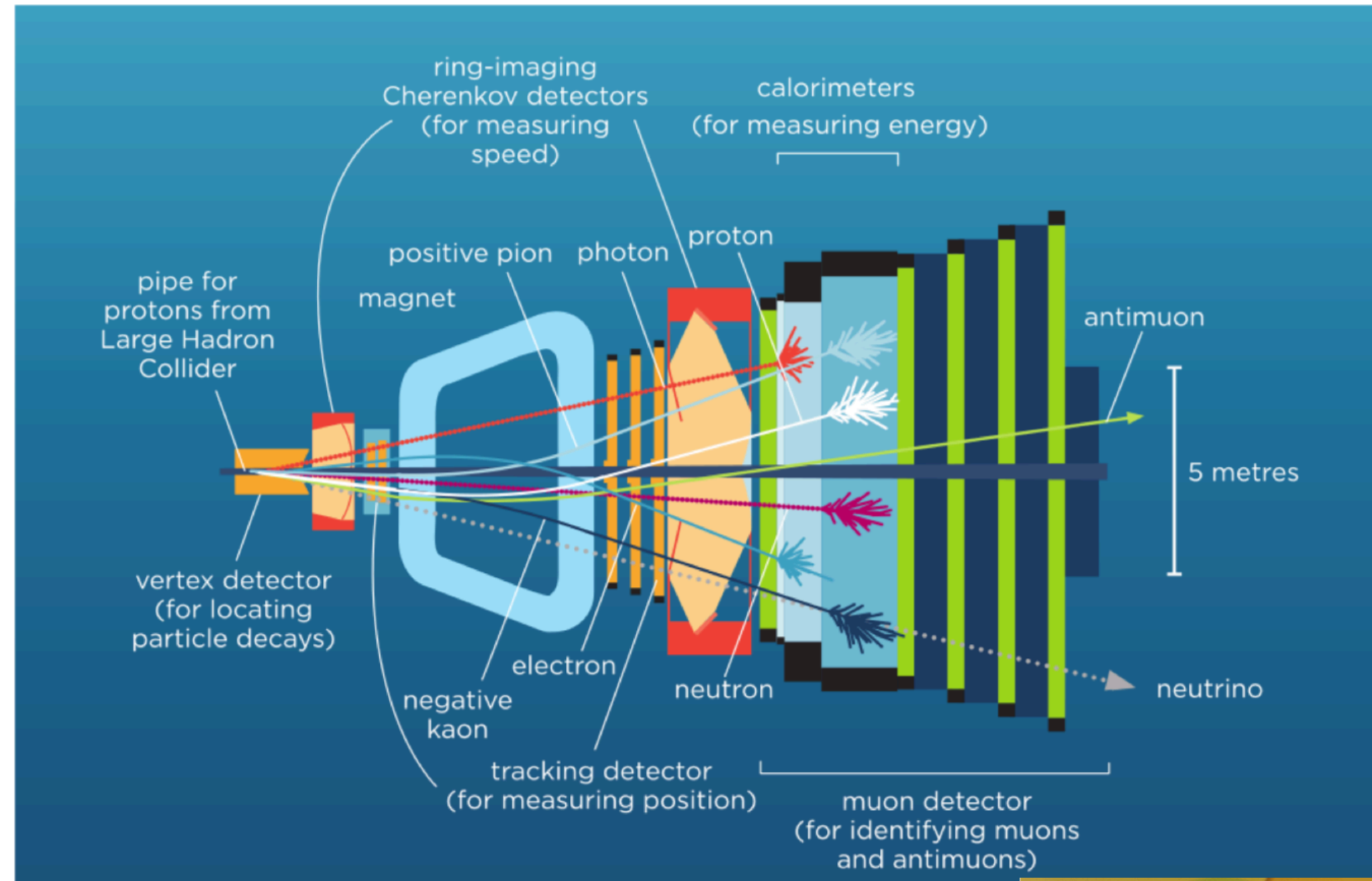
David Hynds



At last constructed
But how tell? How will it last
Entombed in darkness?

LHCb HARDWARE AND ANALYSIS

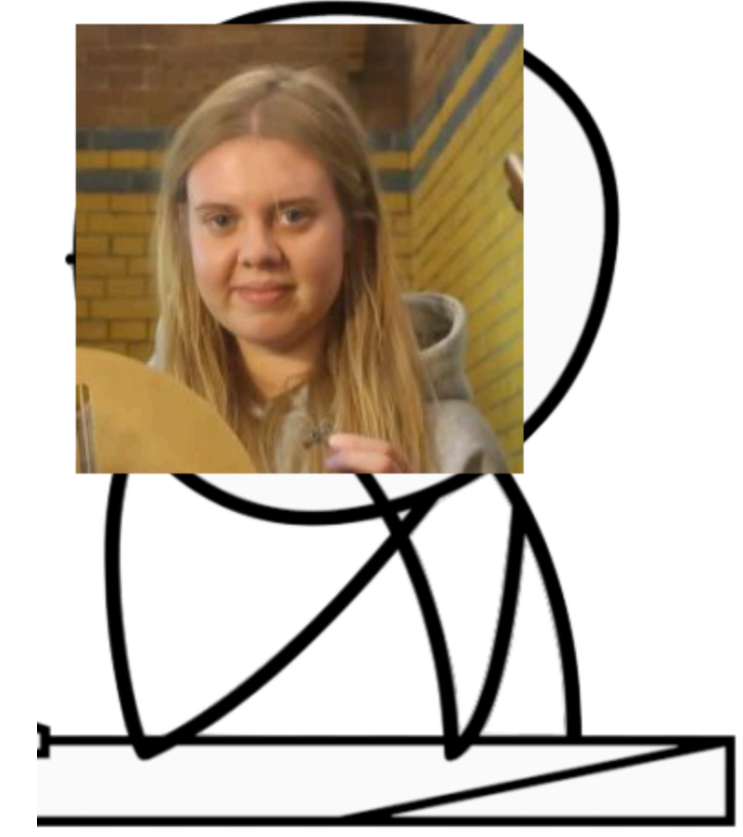
LHCb for beginners [from Antimatter-Matters]



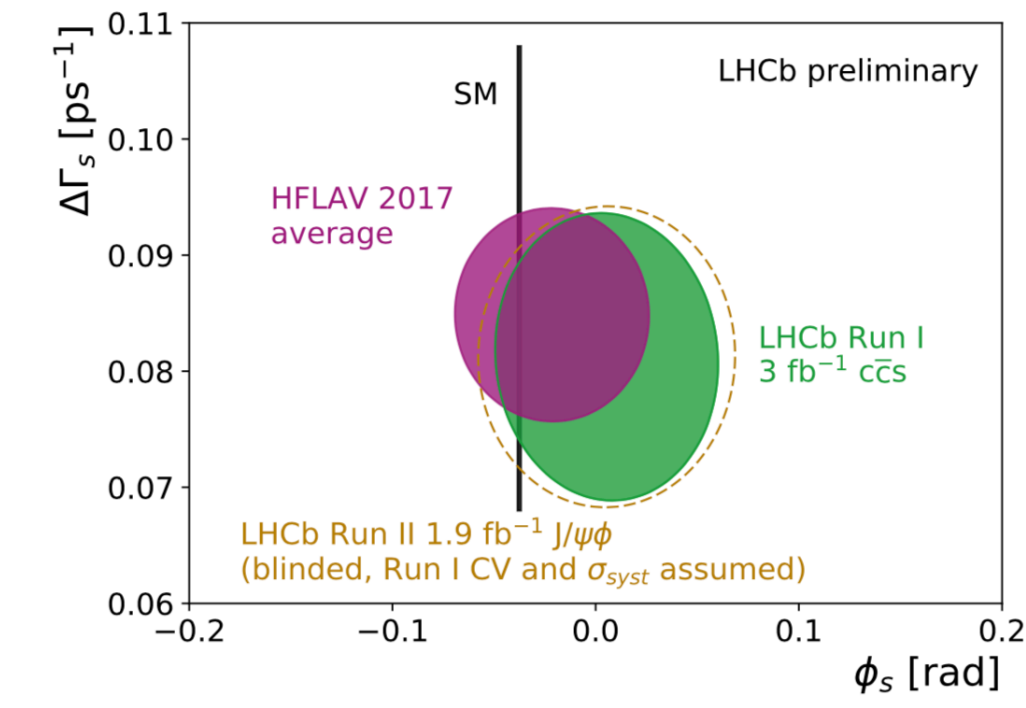
Katya Govorkova

Sevda Esen

Integration hardware, software and analysis

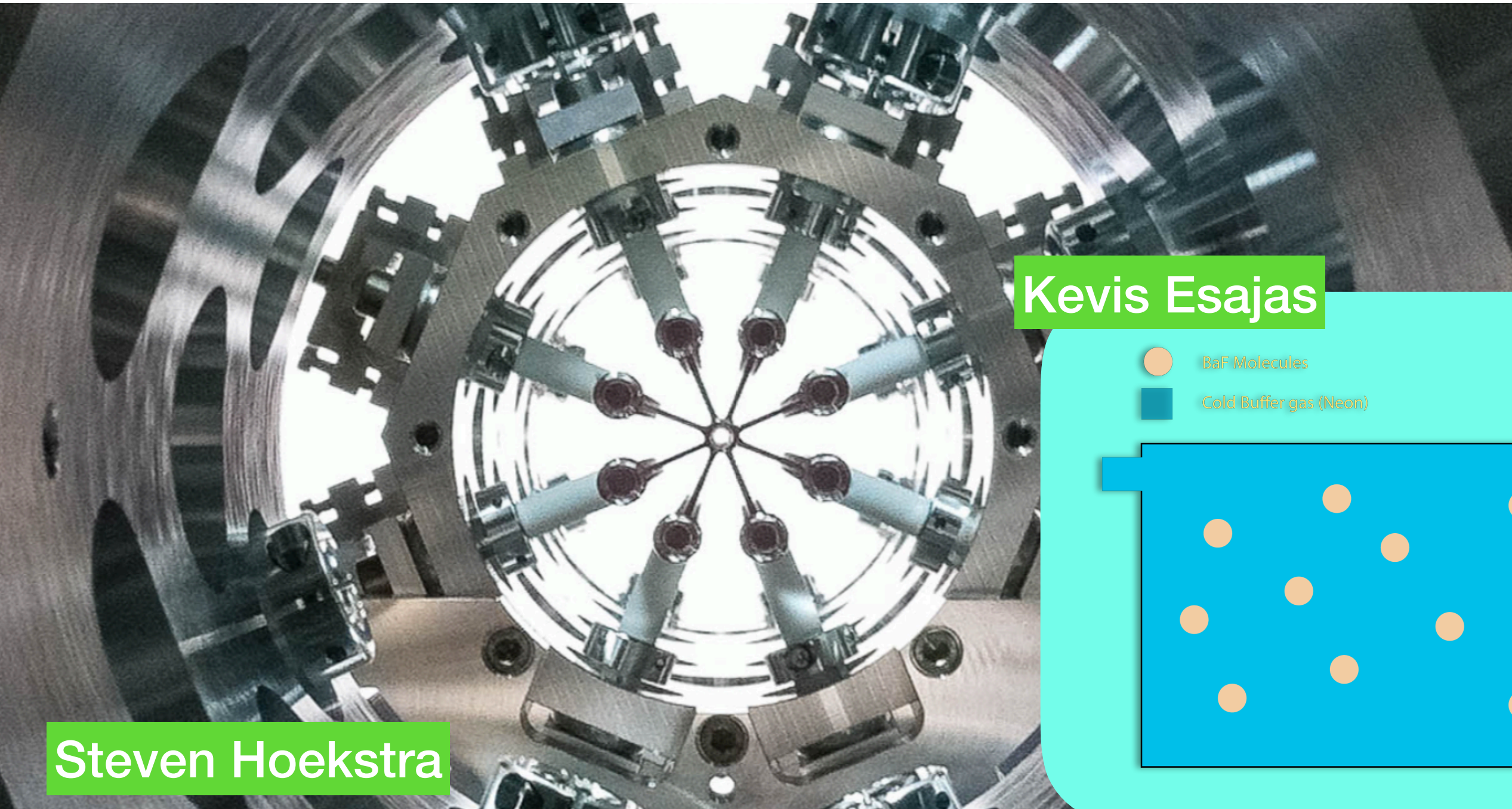


What's next?



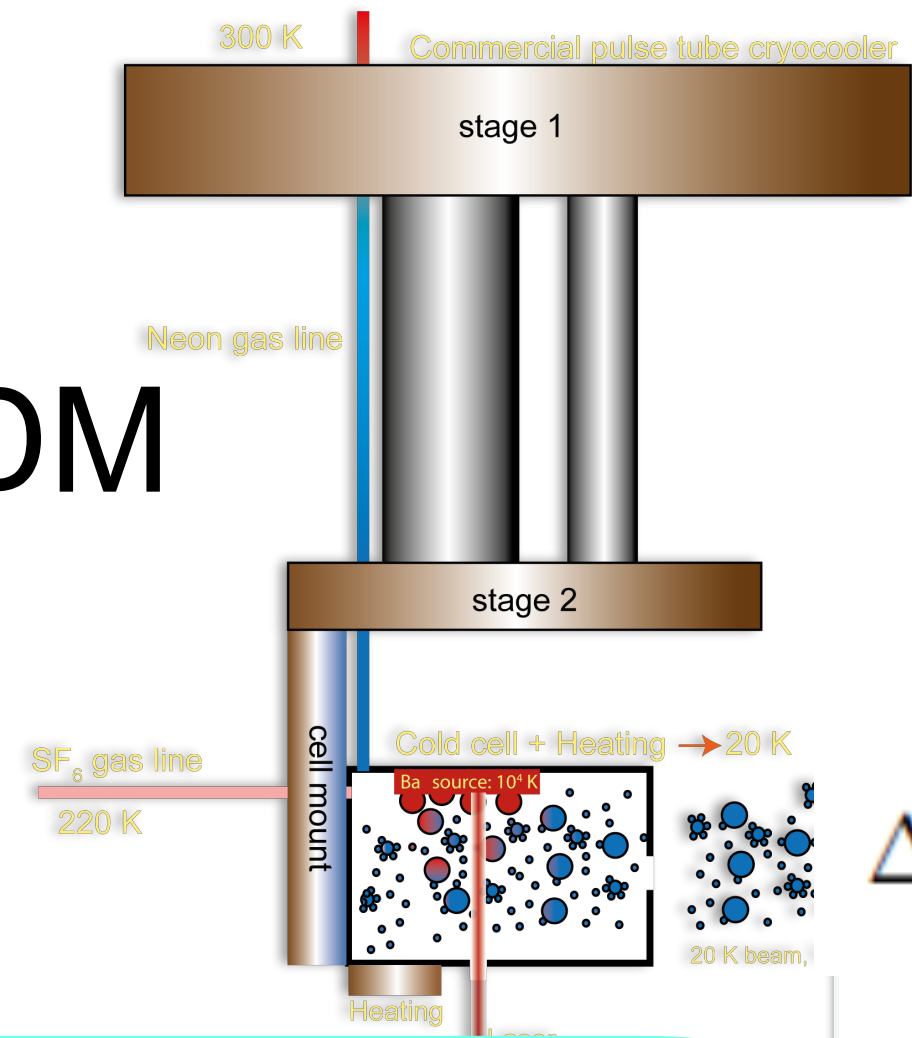
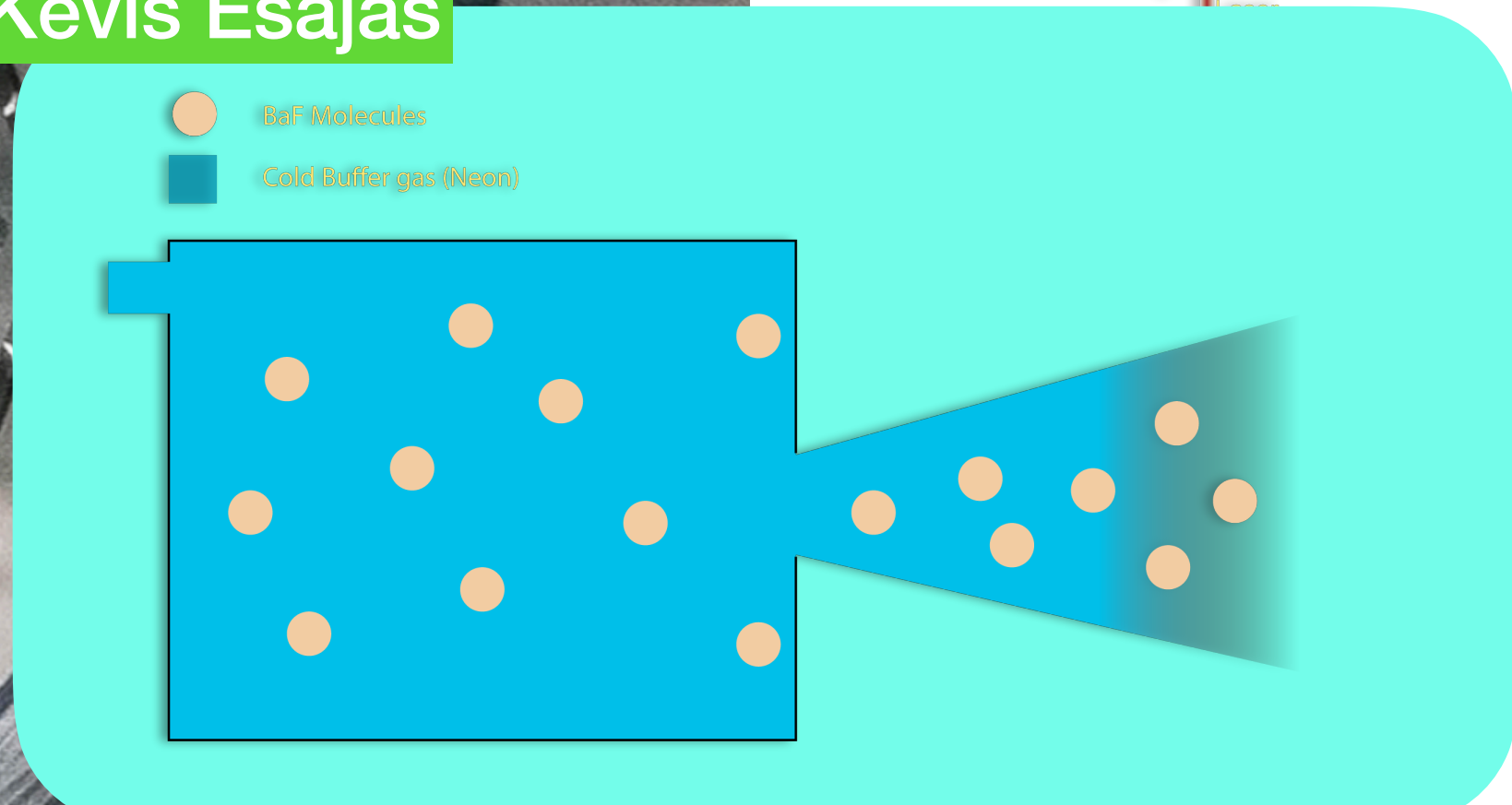
ELECTRON EDM

Lots of progress in Nikhef on-site eEDM

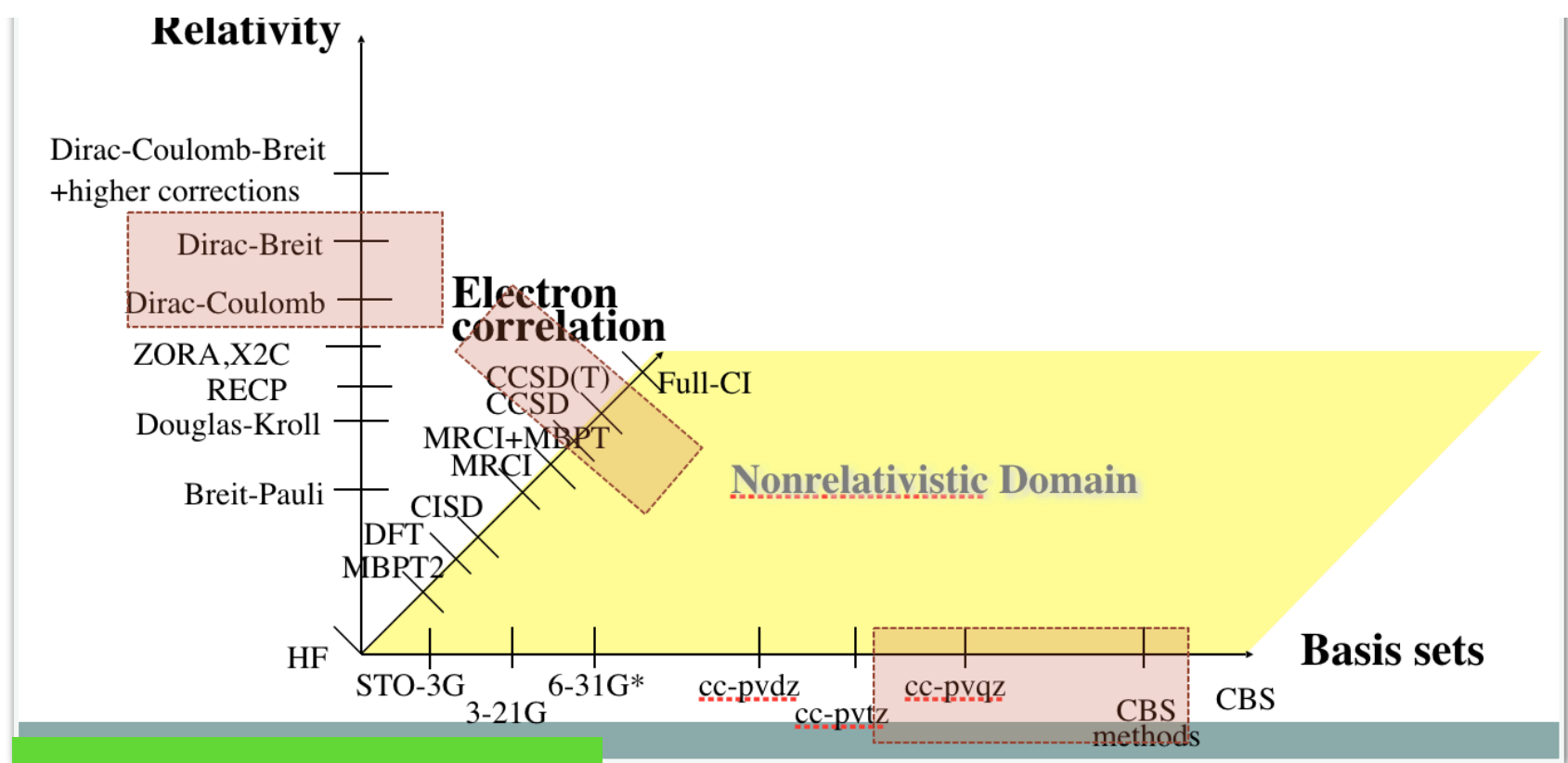


Steven Hoekstra

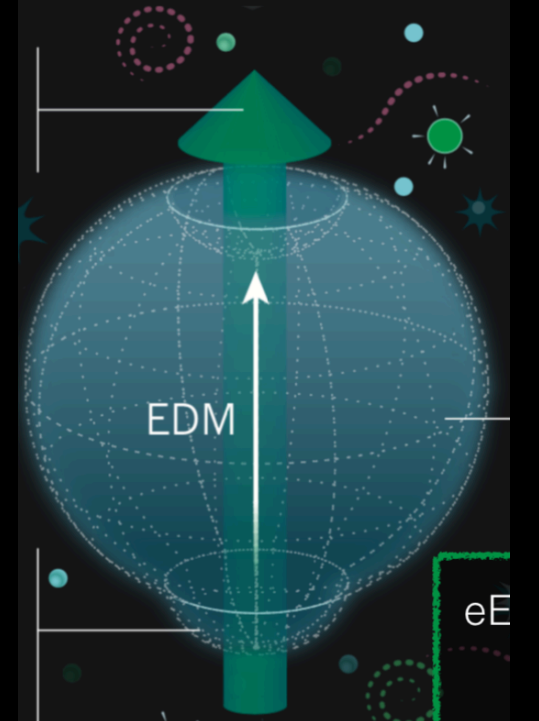
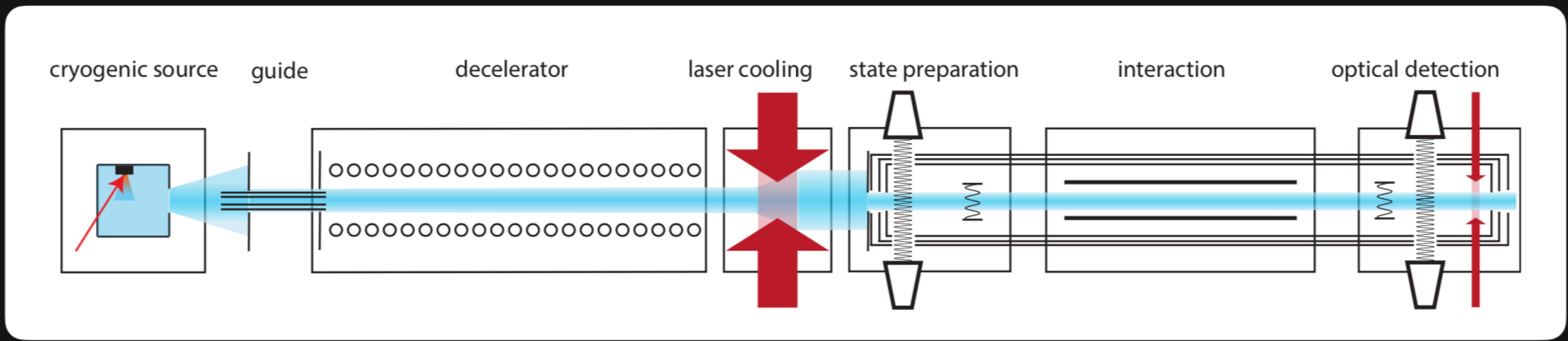
Kevis Esajas



$$\Delta E = (E_{\text{eff}}d_e + W_s C_s) \langle \vec{n} \cdot \vec{z} \rangle (E_{\text{ext}})$$



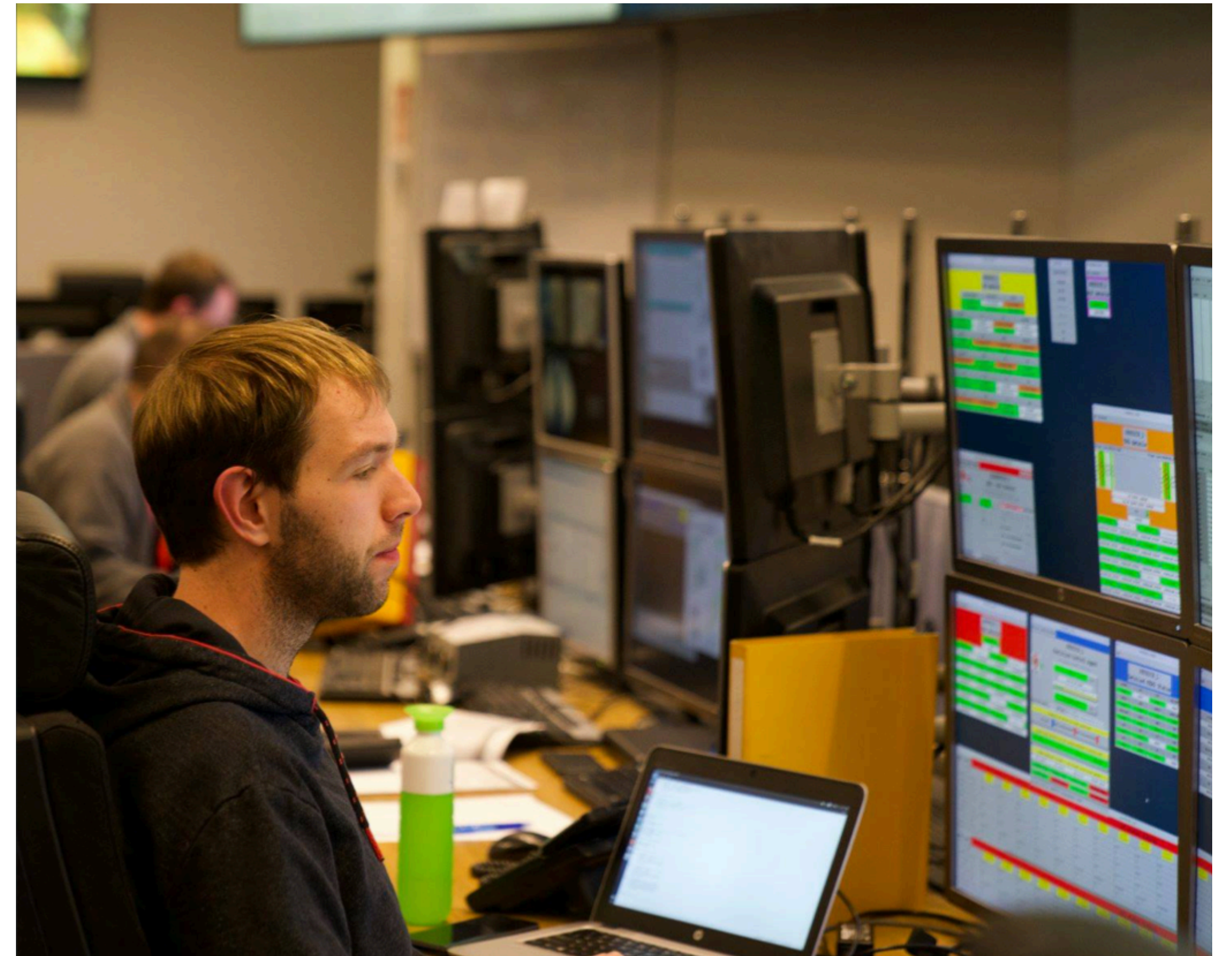
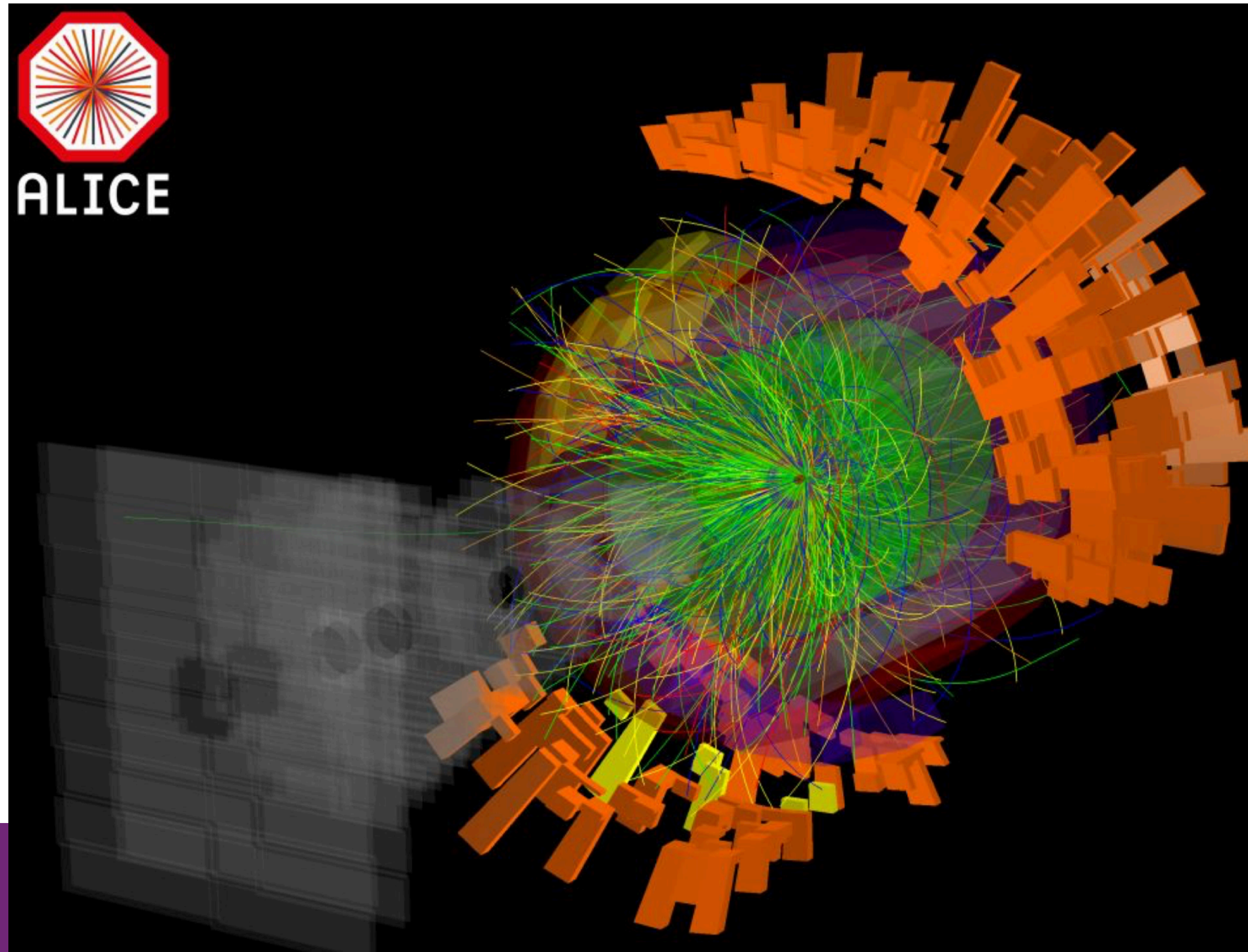
A. Borschevsky



ALICE

Huge success HI run

- ALICE run and data analysis and h/w



Mike Sas

ALICE

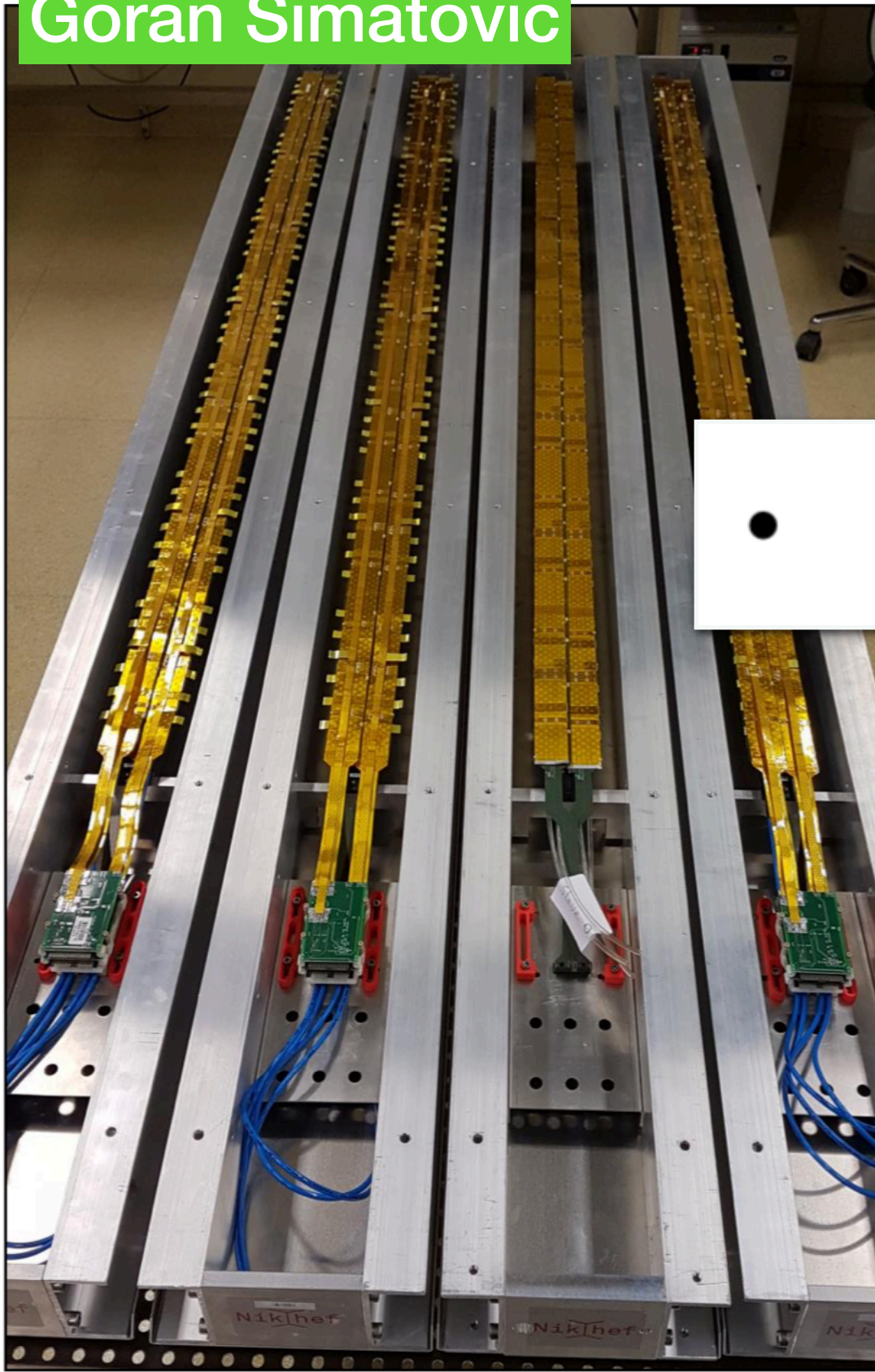
Conferences & Prizes

Talks at all major conferences: ICHEP, Quark Matter, Hard Probes,...

- Students can't have all the fun!

Best experimental talk:
Barbara

Best poster:
Mike

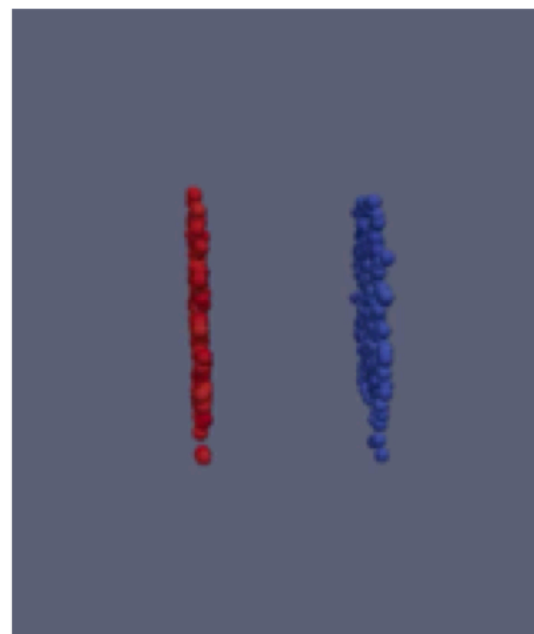


Jacopo Cum laude!
"Rotating planes, fluctuating shapes"



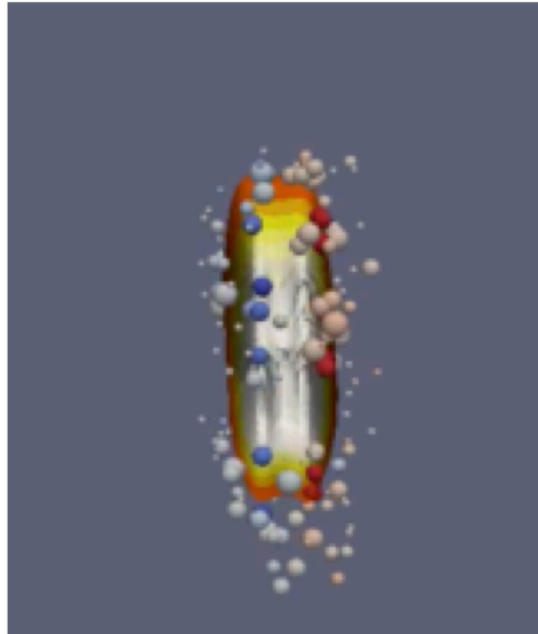
Heavy ions

$\tau \sim 0$



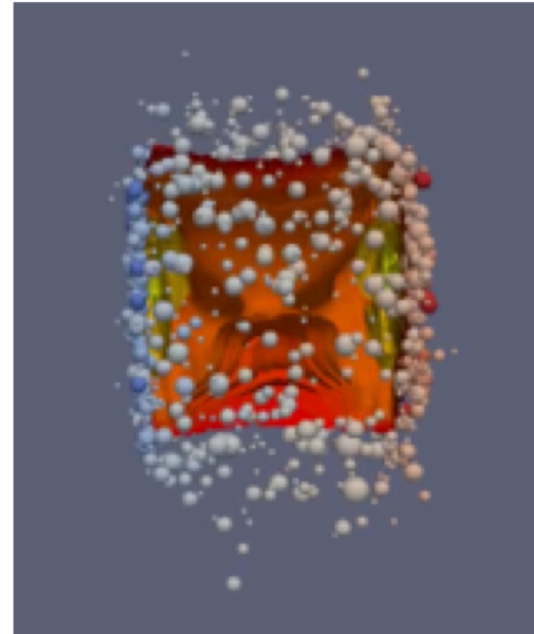
QGP

$\tau \sim 1 \text{ fm/c}$



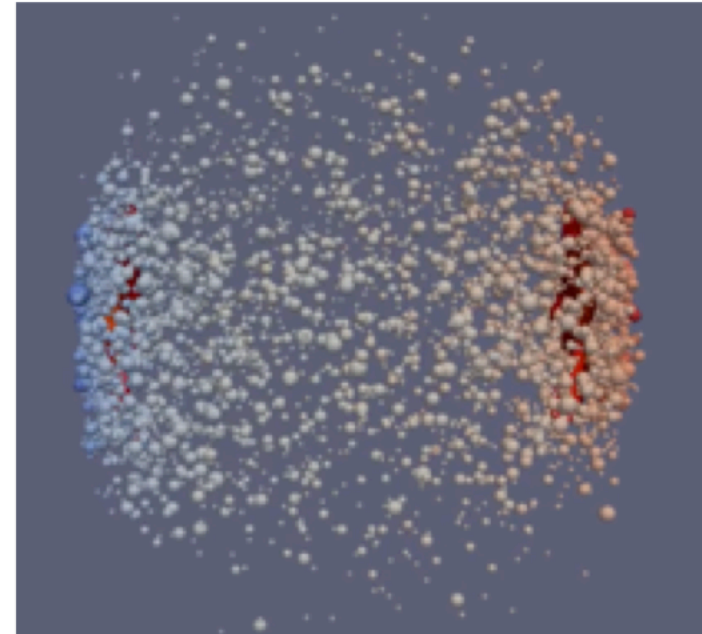
QGP

$\tau \sim 5 \text{ fm/c}$



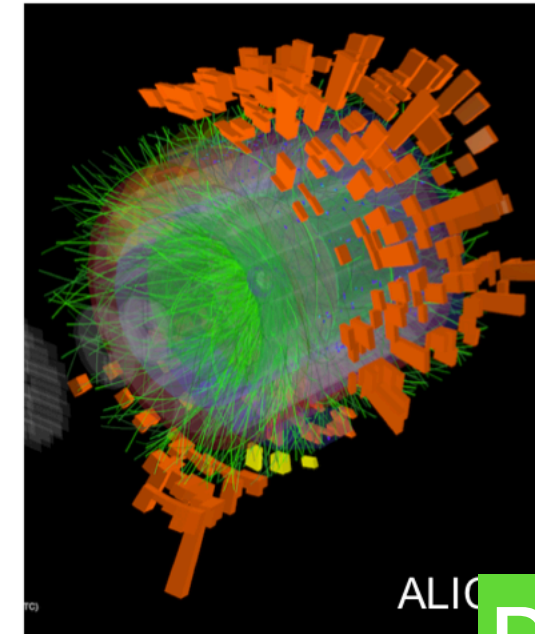
Hadrons

$\tau > 10 \text{ fm/c}$



Detection

$\tau > 10 \text{ pm/c}$



• Student involvement

- three PhD students involved with the ITS upgrade via Service Tasks
- all procedures demonstrated and documented (online manuals)
- student work is independent and needs little supervision

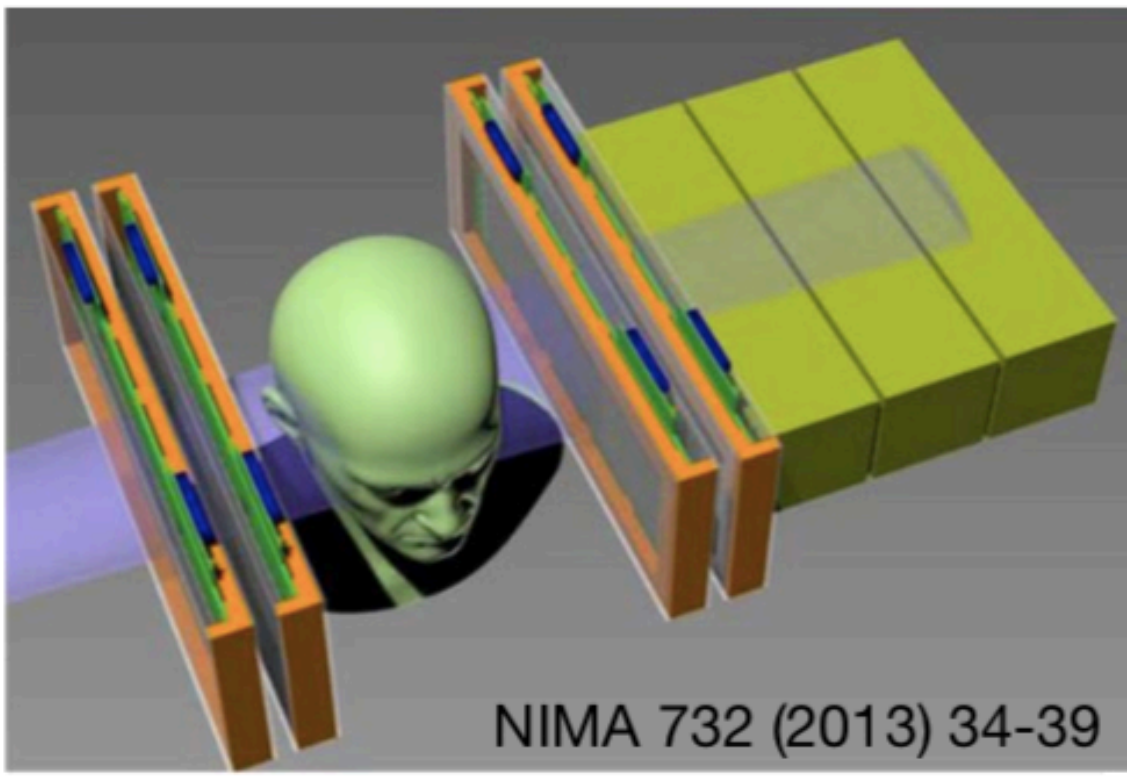
ALICE, CALICE AND FOCAL

Nikhef

-  **Outer-Limits** @spudnickrocket · Aug 3
Replying to @CERN @_nikhef
Great thanks Satan!
1 comment 2 likes
-  **I have no clue.** @AndresS45303251 · Aug 5
End times. Gonna be awesome to be in Heaven!!!
1 comment 1 like
-  **I have no clue.** @AndresS45303251 · Aug 5
Replying to @TheSmit01963313 @CERN @_nikhef
It isn't the chip, it is the nano particles in the chem trails.
1 comment 1 like

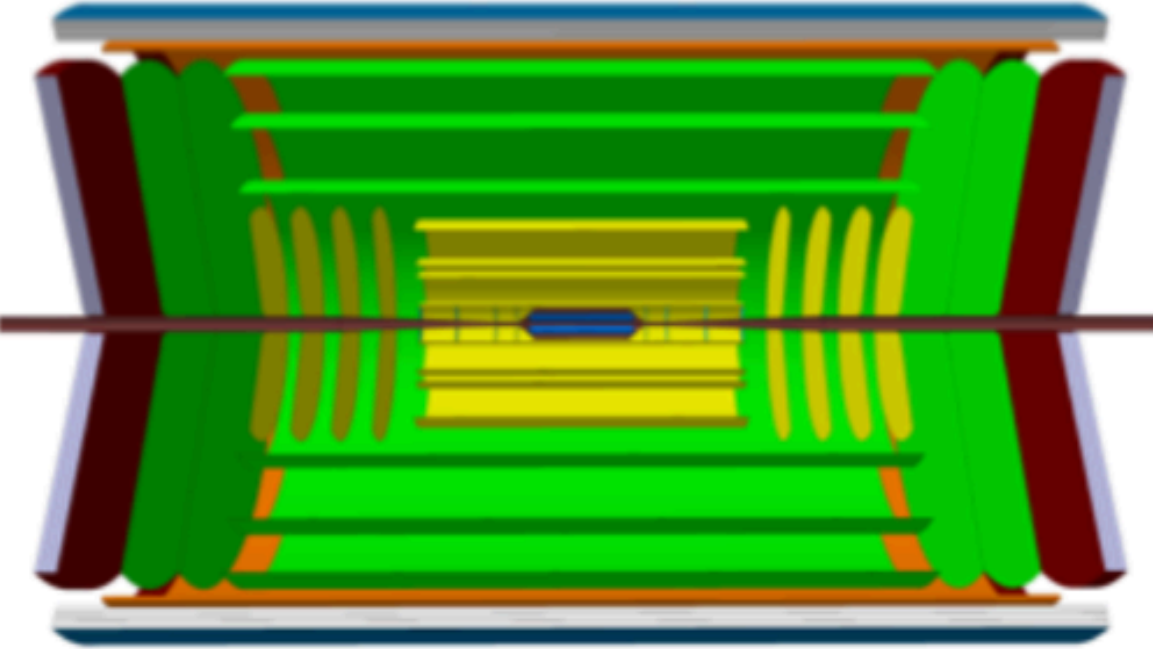


• by Marc

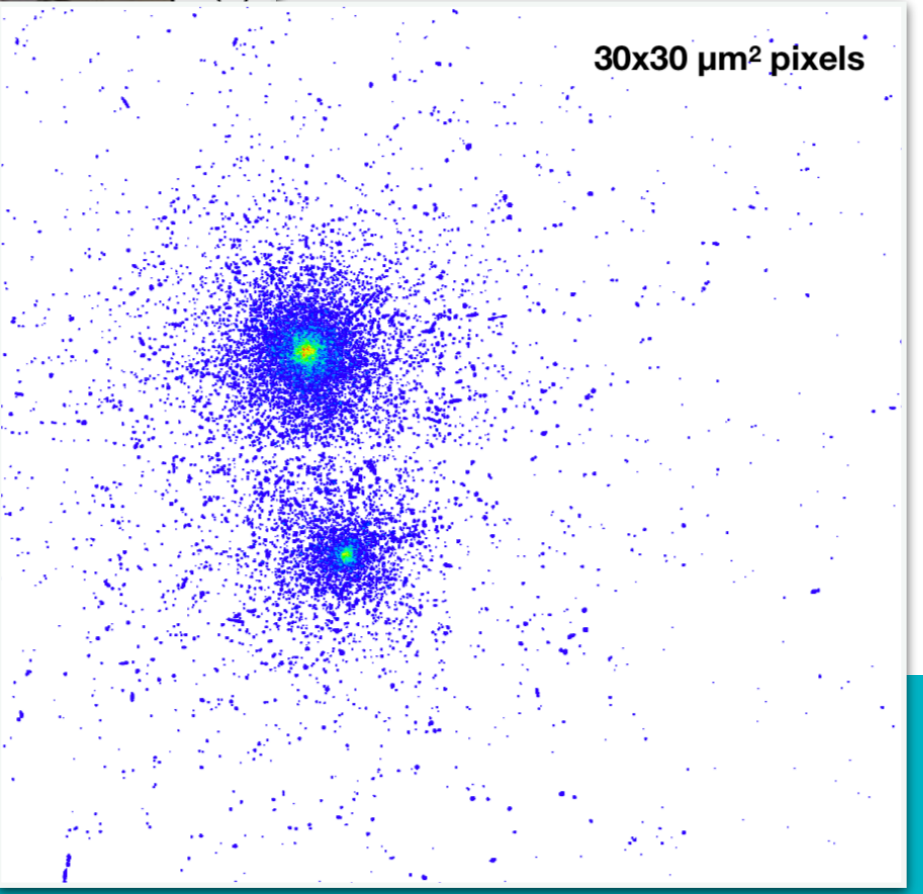


NIMA 732 (2013) 34-39

Shower Pixel Detector

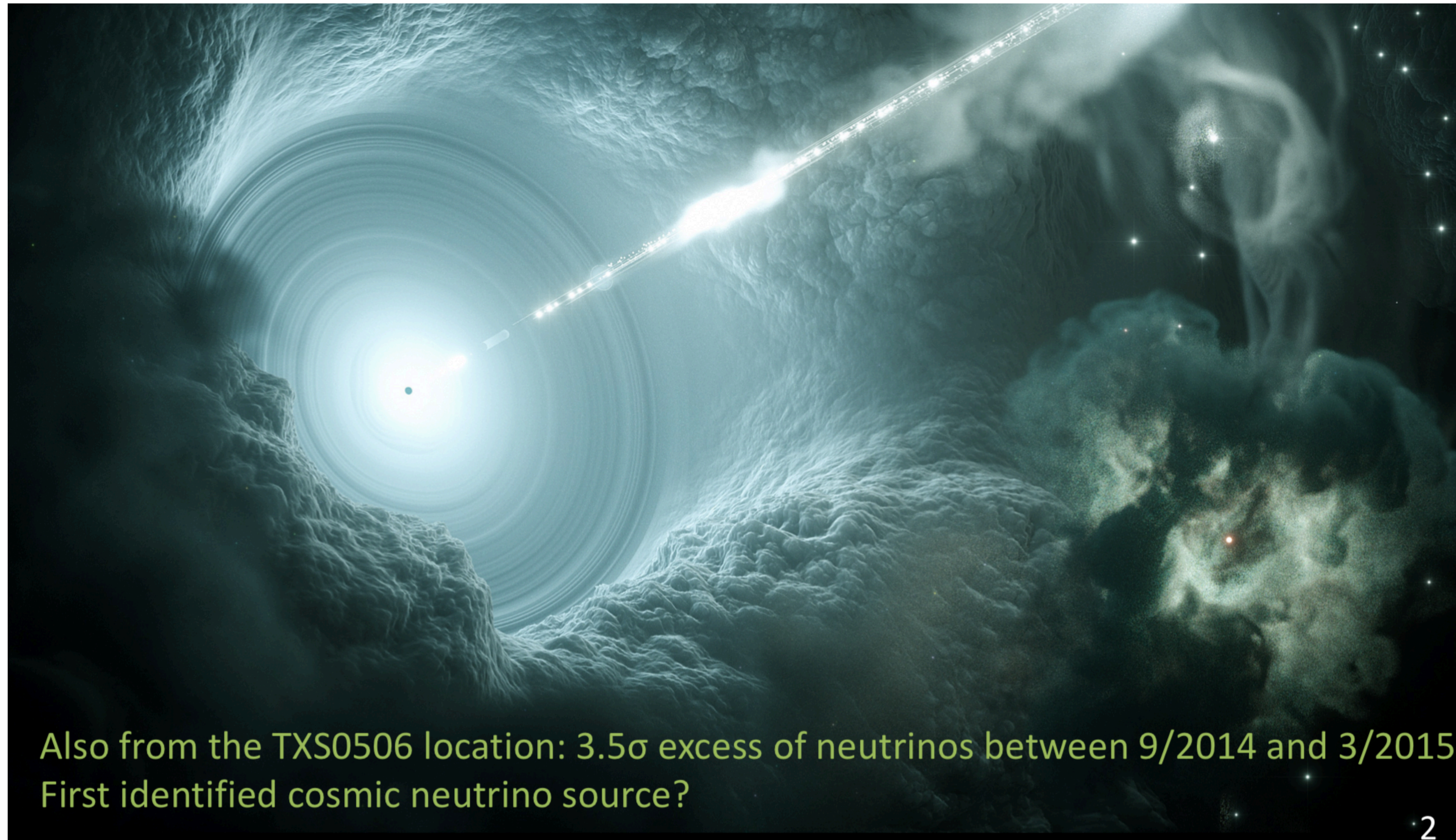


Naomi van der Kolk



Sometime suffer social media...

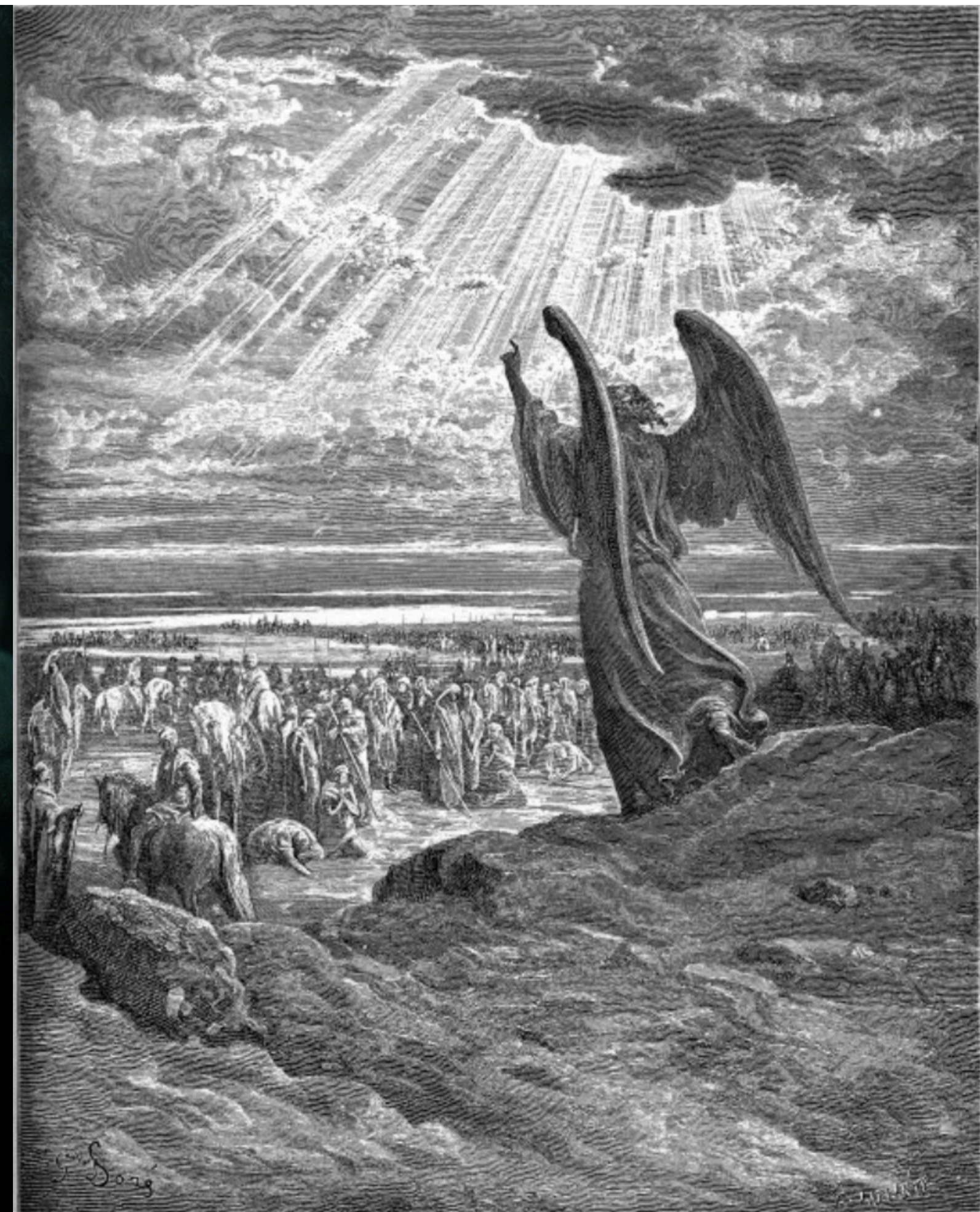
NEUTRINO SOURCES IN THE SKY



Also from the TXS0506 location: 3.5σ excess of neutrinos between 9/2014 and 3/2015
First identified cosmic neutrino source?

2

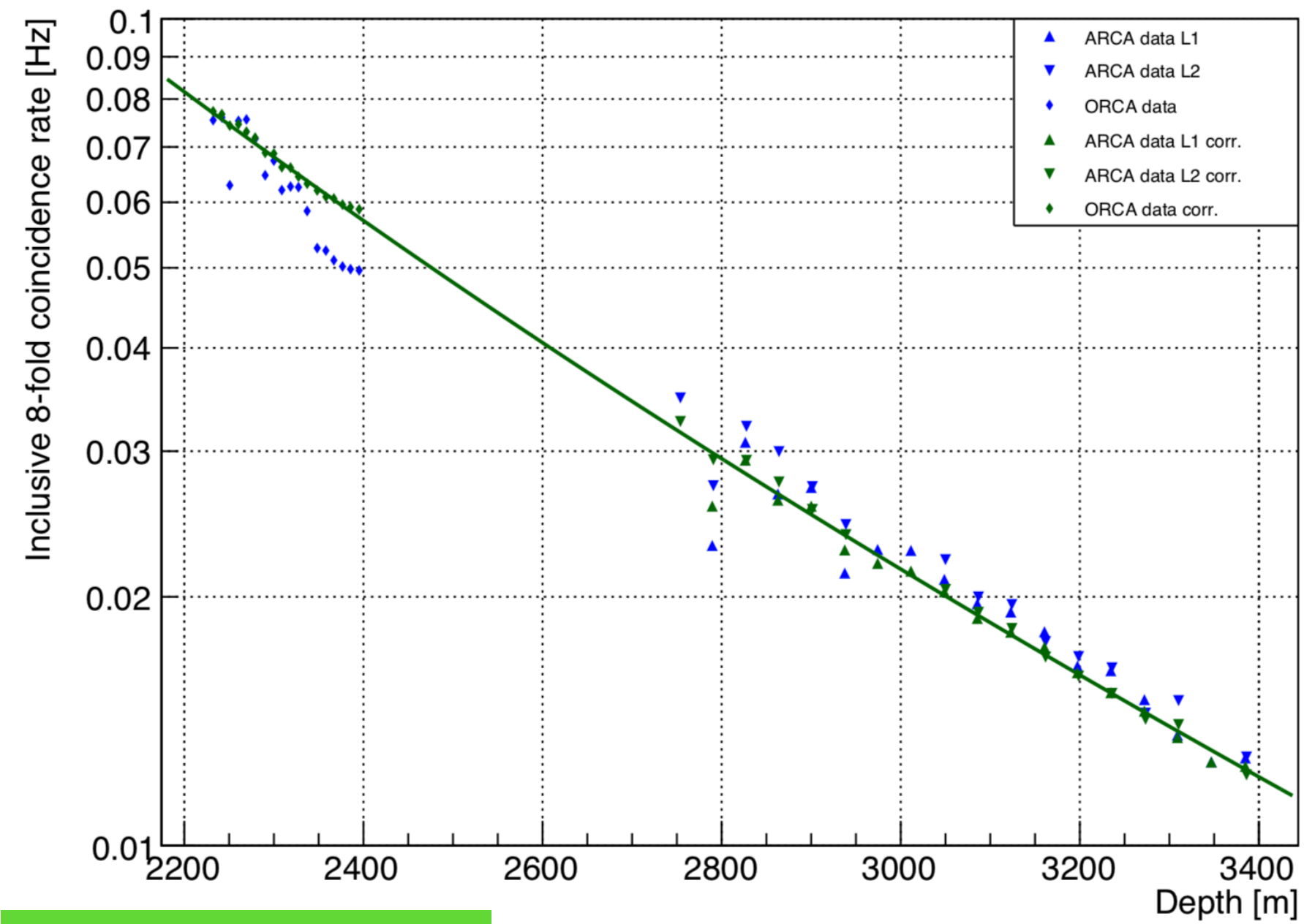
Paul de Jong



Gustav Dore

NEUTRINO

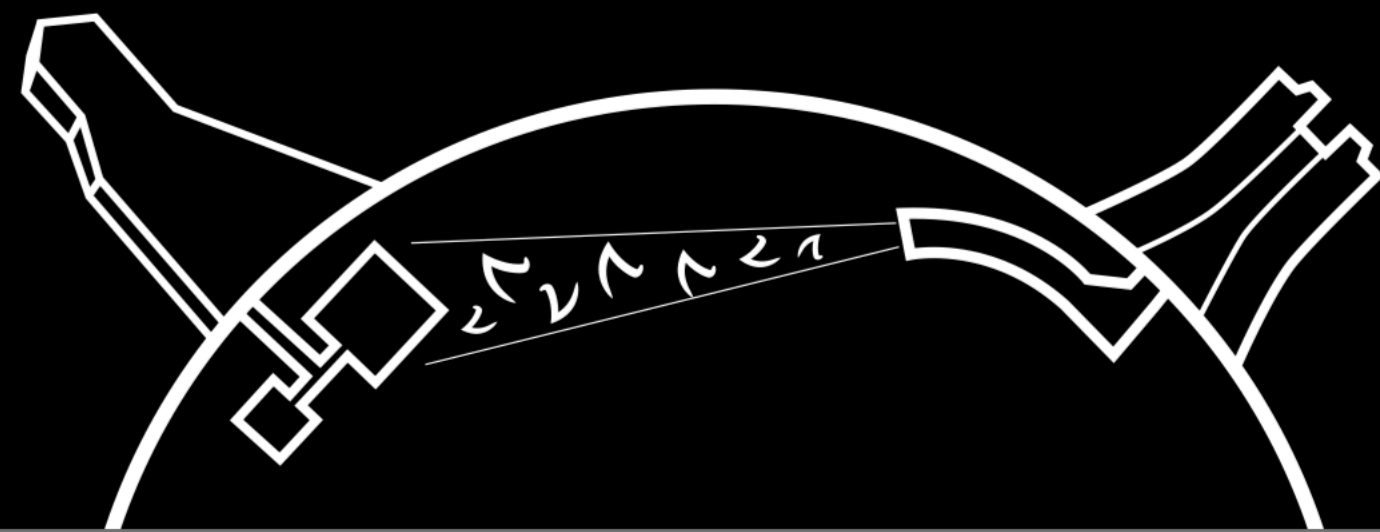
KM3NeT preliminary



Bruno Sandberg

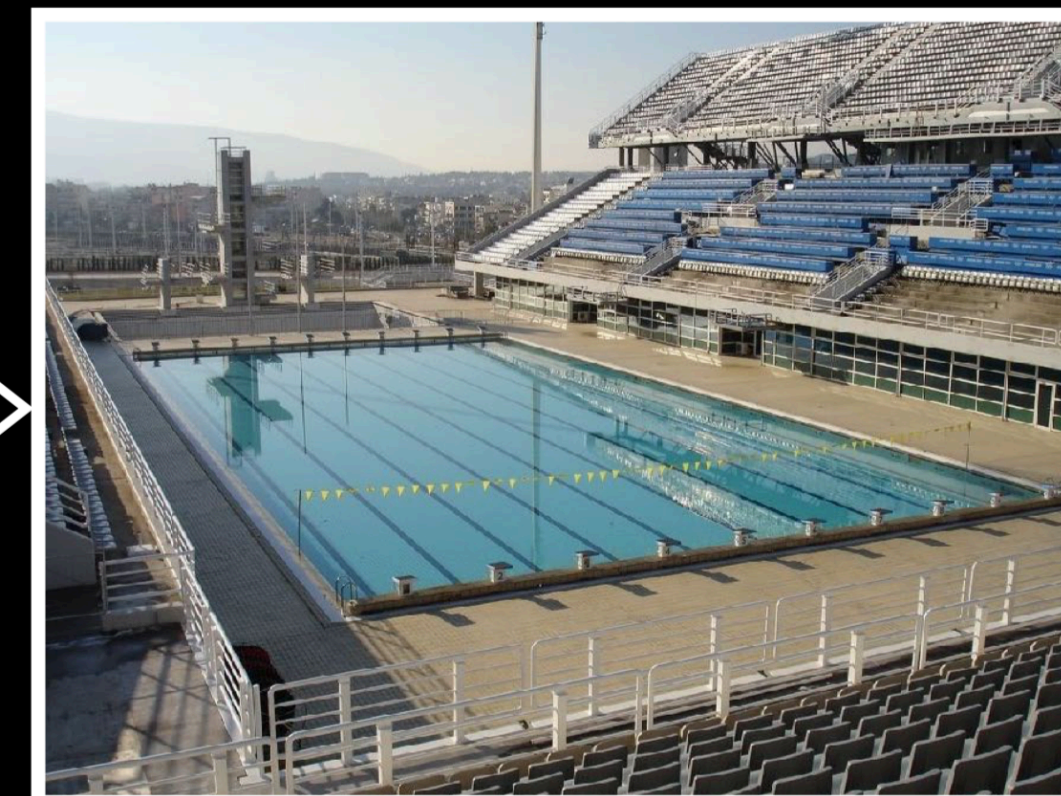
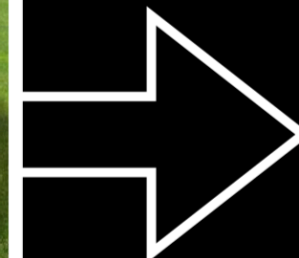


18



12

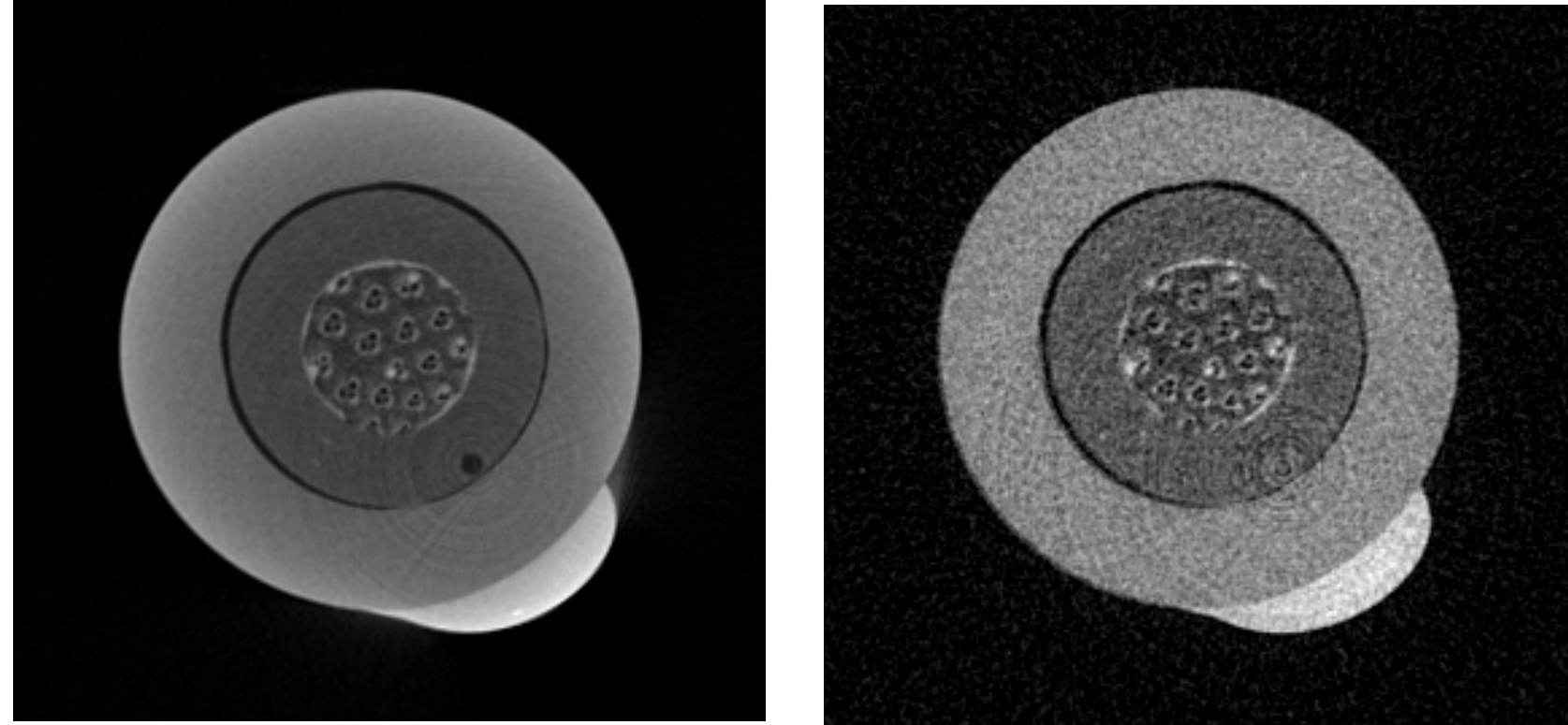
Milo Vermeulen



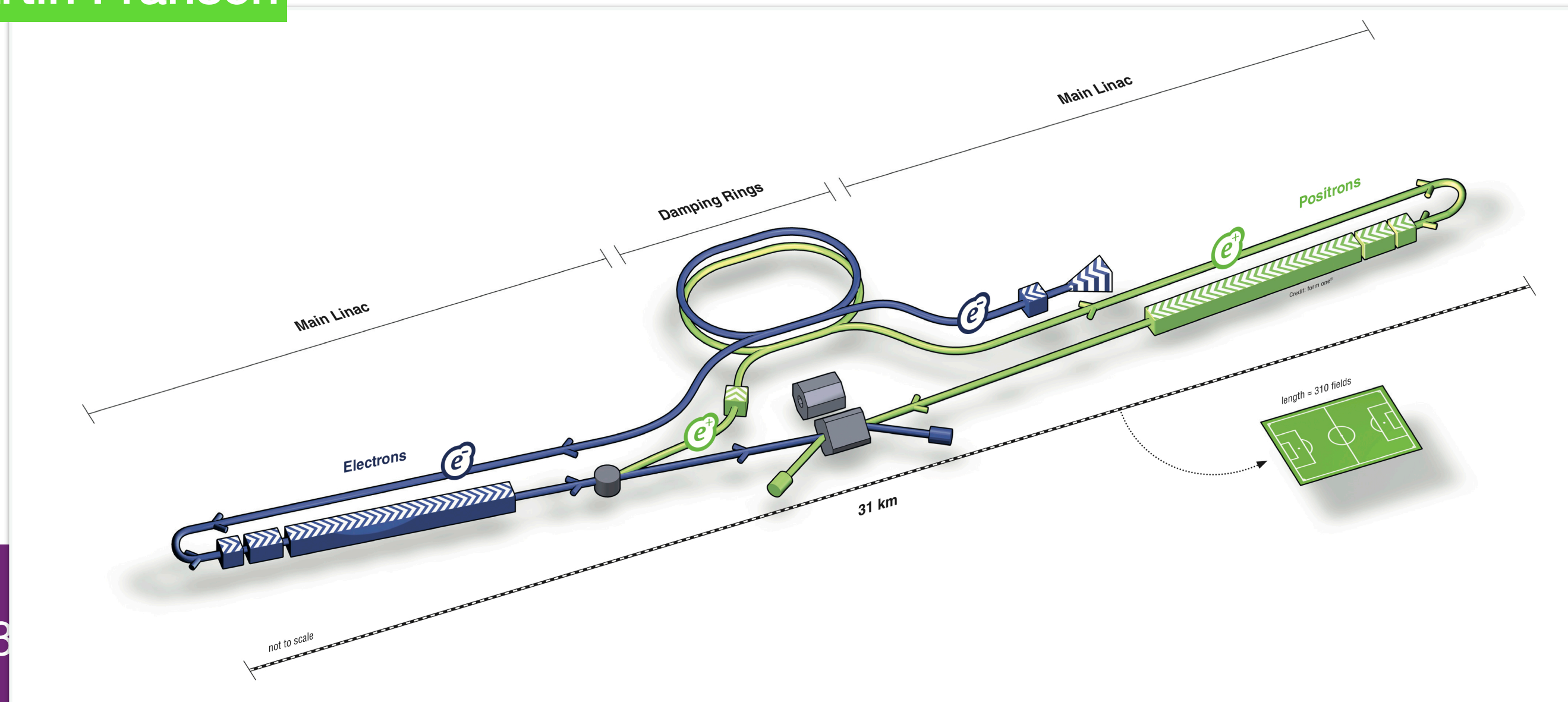
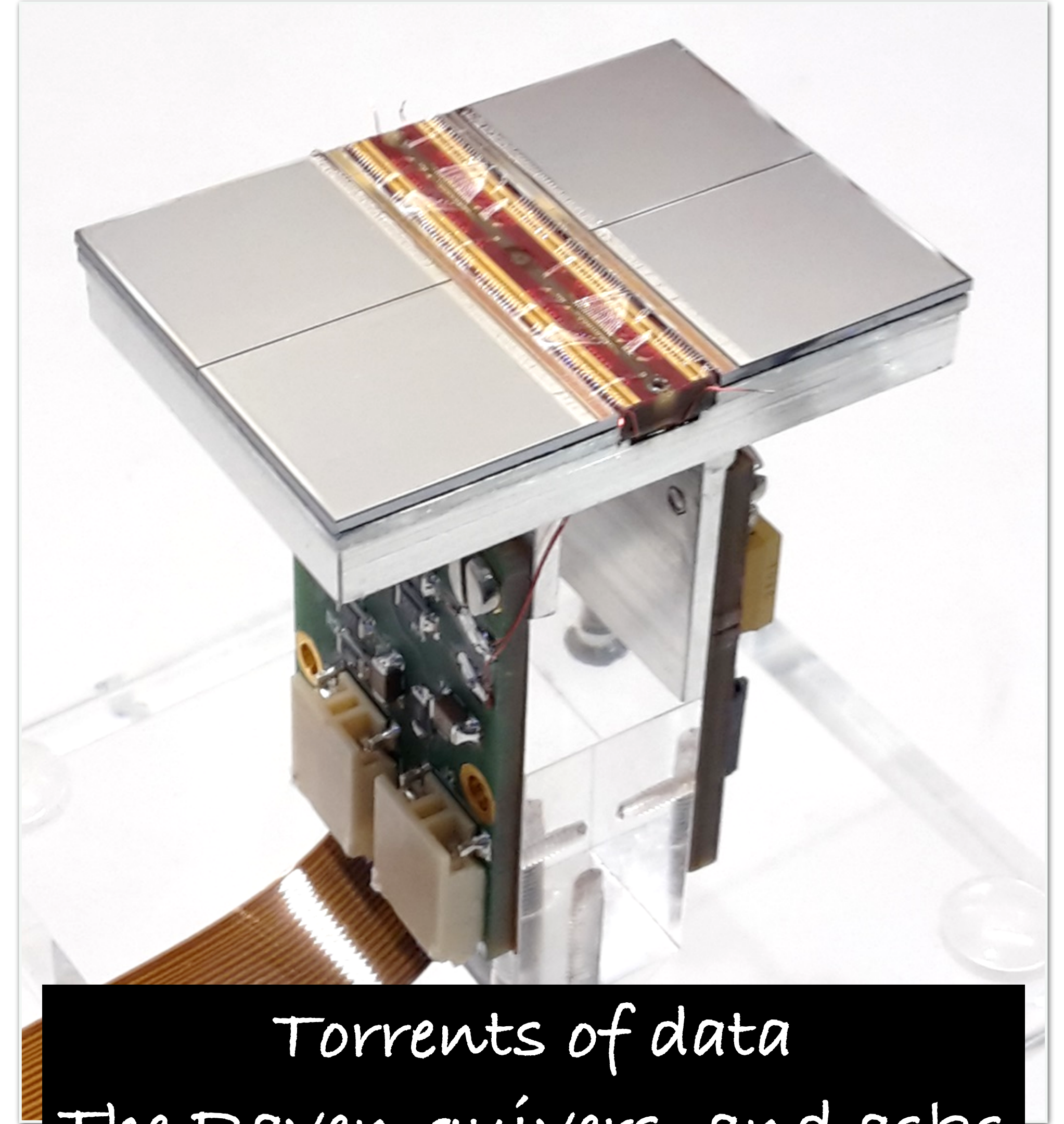
15



Down the rabbit hole



Henk Jan Bulten

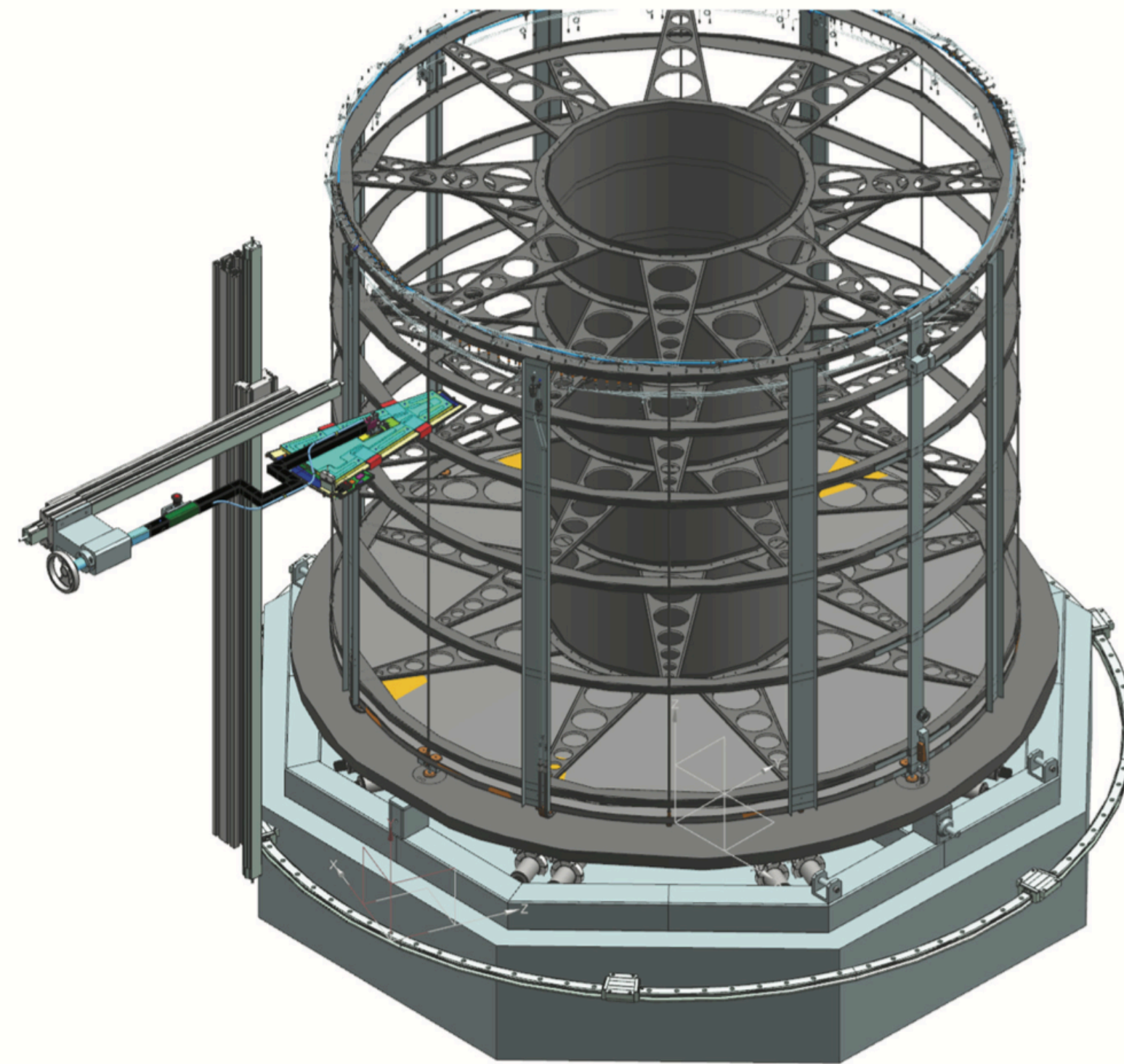
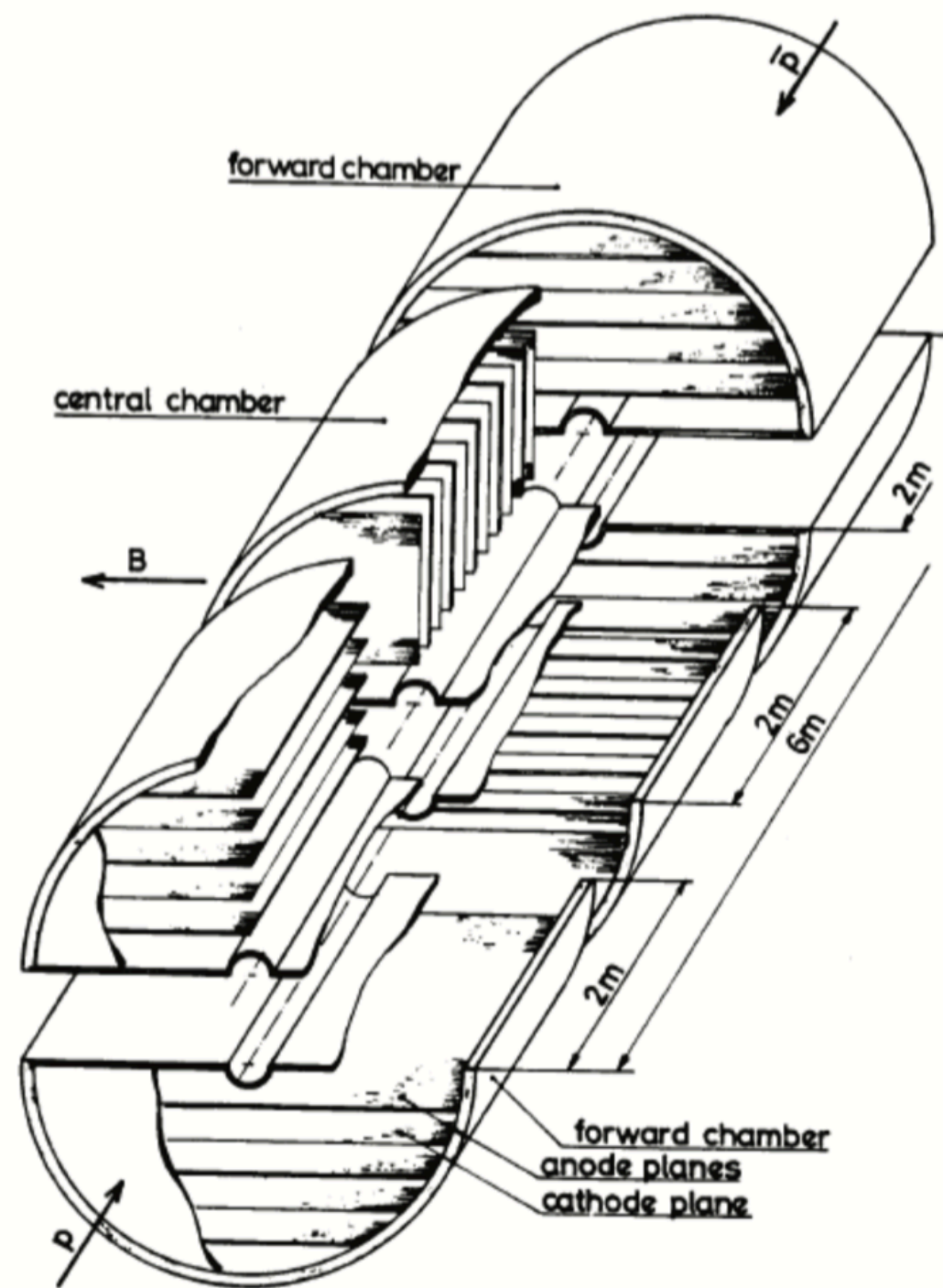


Torrents of data
The Raven quivers, and asks
How to reconstruct?

ATLAS

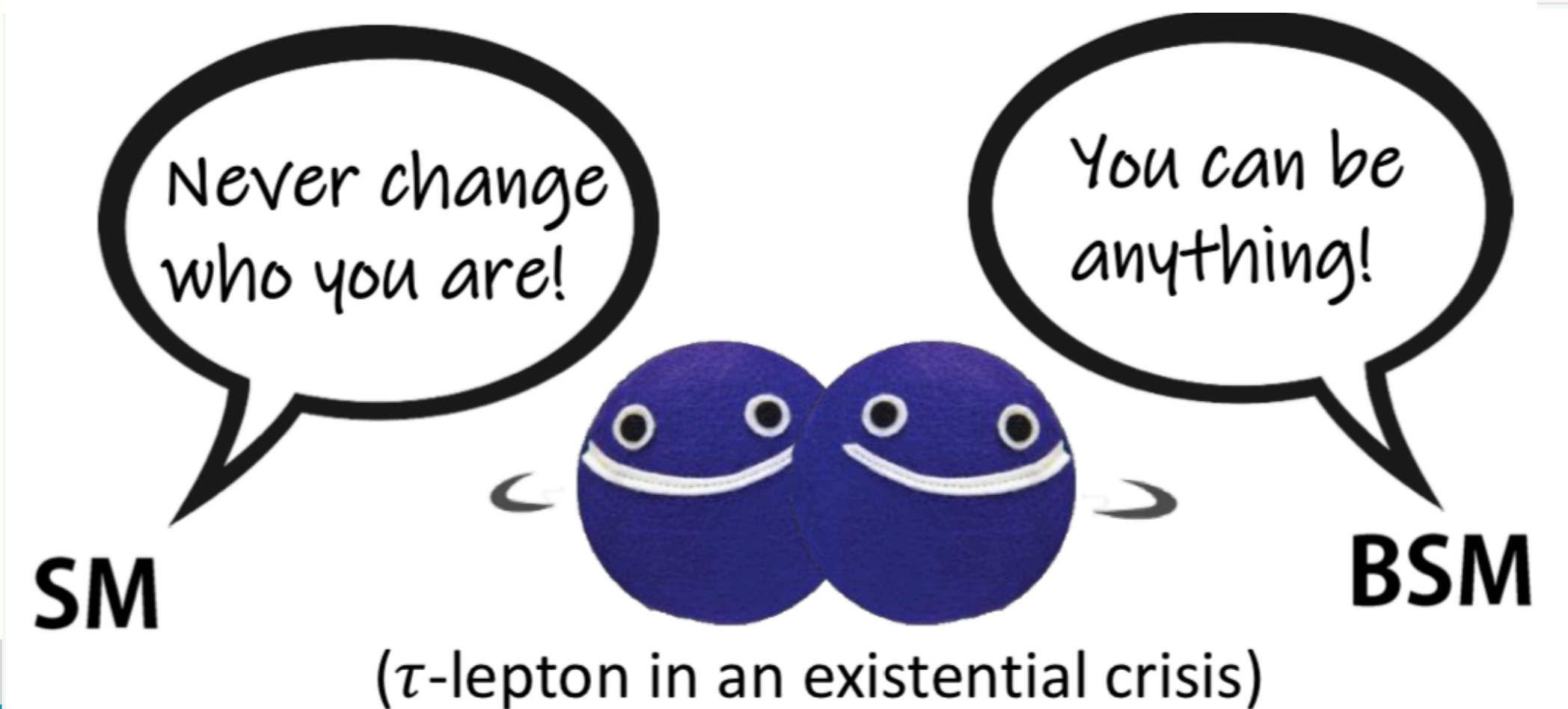
Facing a major upgrade in 2025
Large data sets to analyse now

Nicolo de Groot



◦ $Z \rightarrow e\tau$:

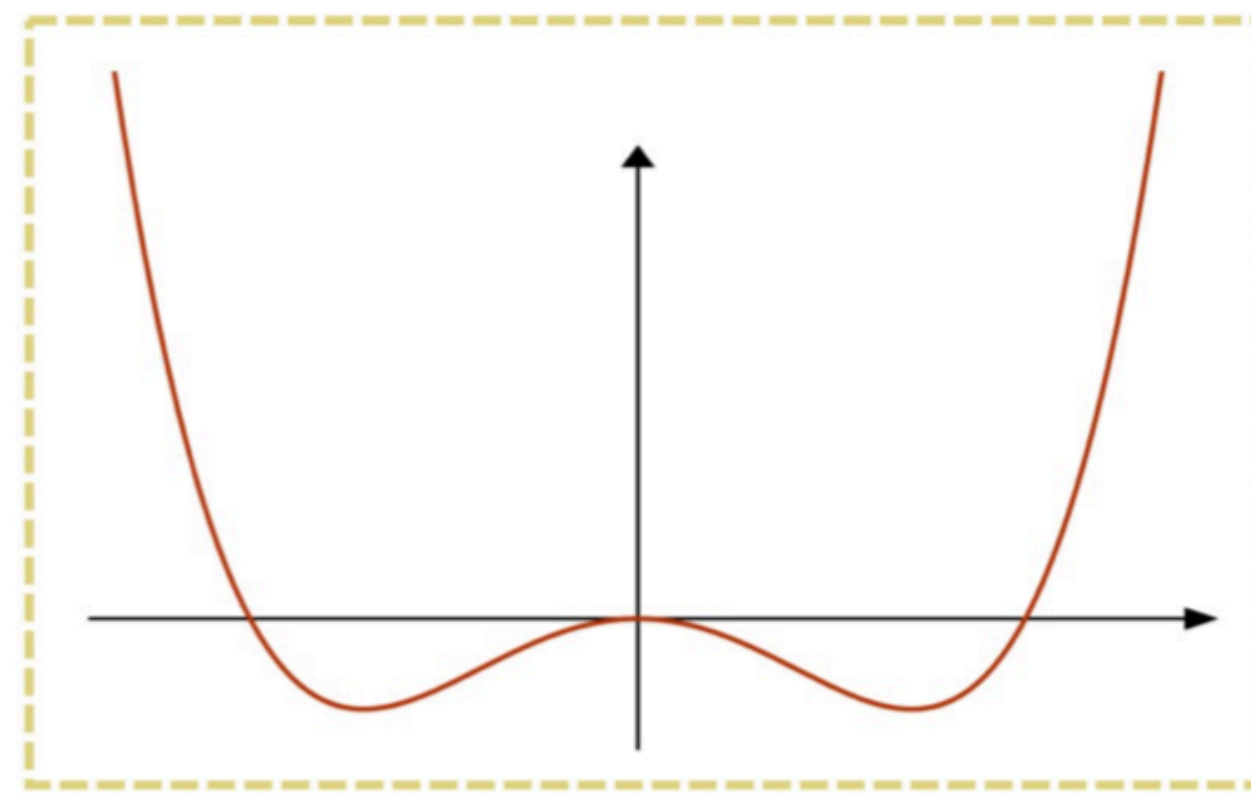
- 2.3σ excess observed
- 95% CL limit: $BR(Z \rightarrow e\tau) < 5.8 \times 10^{-5}$



Bob van Eijk

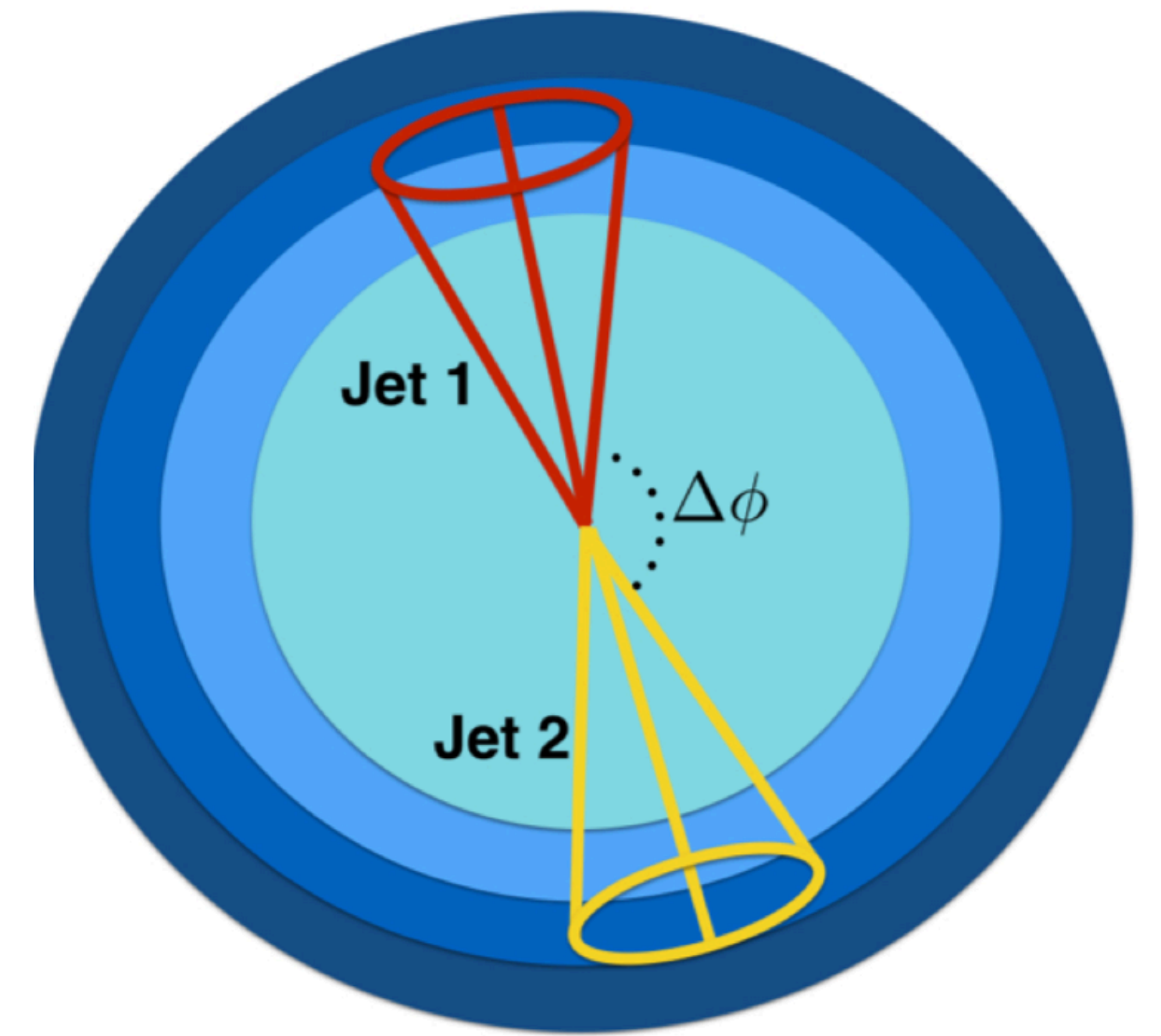
Wing Sheung Chan

ATLAS AND THE HIGGS HIGHLIGHTS



Brian Moser

$$+ |D_\mu \phi|^2 - \mu^2 (\phi^\dagger \phi) - \lambda (\phi^\dagger \phi)^2 + y_{ij} \psi_i \phi \psi_j + \text{h.c.}$$



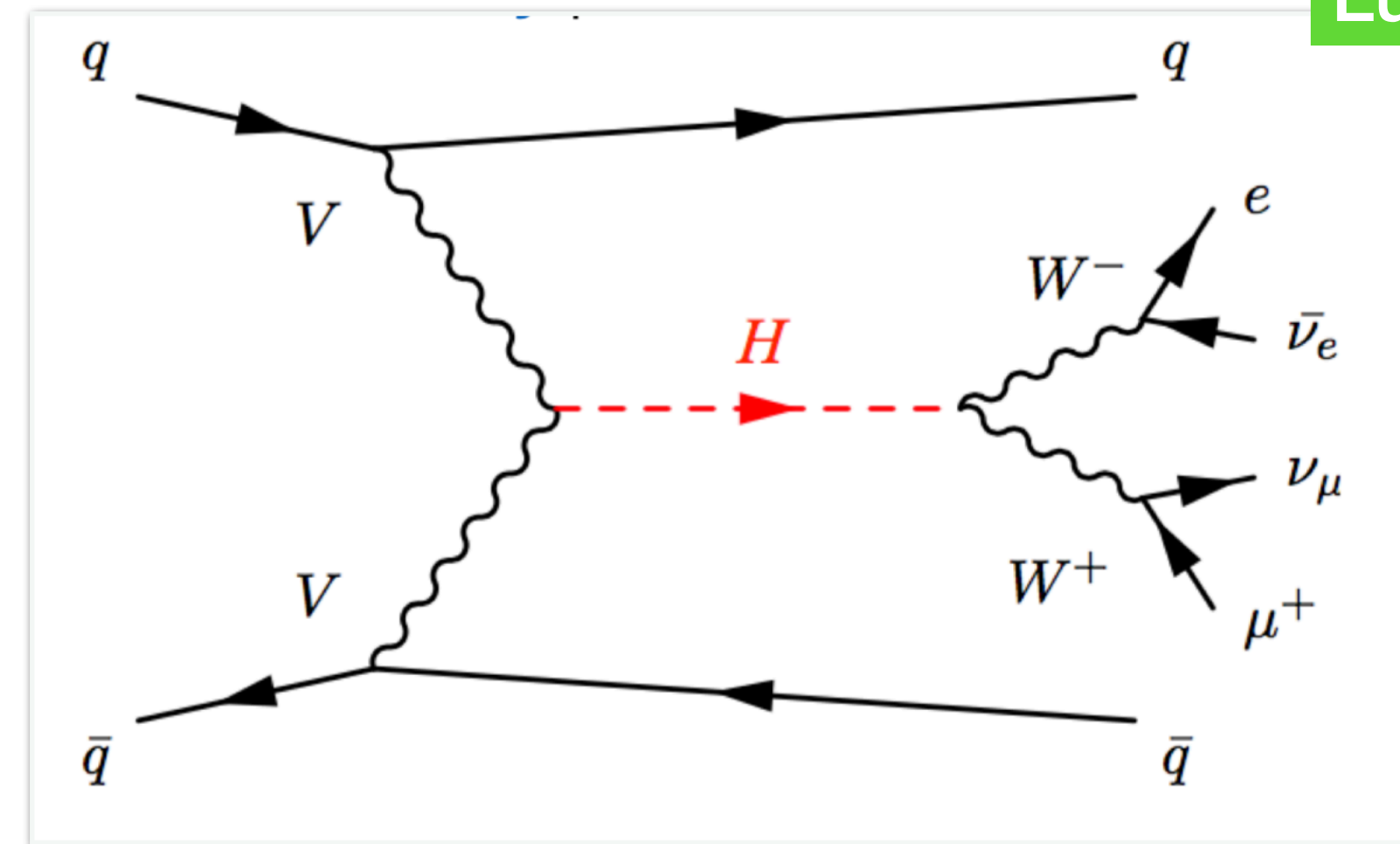
Lucrezia Stalla Bruni

	1.	2.	3.	1.	2.	3.
mass	≈2.2 MeV/c ²	≈1.28 GeV/c ²	≈173.1 GeV/c ²	≈0.511 MeV/c ²	≈105.66 MeV/c ²	≈1.7768 GeV/c ²
charge	2/3	2/3	2/3	-1	-1	-1
spin	1/2	1/2	1/2	1/2	1/2	1/2
QUARKS	up	charm	top	electron	muon	tau
	≈4.7 MeV/c ²	≈96 MeV/c ²	≈4.18 GeV/c ²	<2.2 eV/c ²	<1.7 MeV/c ²	<15.5 MeV/c ²
	-1/3	-1/3	-1/3	0	0	0
	1/2	1/2	1/2	1/2	1/2	1/2
LEPTONS	down	strange	bottom	electron neutrino	muon neutrino	tau neutrino

2017

	1.	2.	3.	1.	2.	3.
mass	≈2.2 MeV/c ²	≈1.28 GeV/c ²	≈173.1 GeV/c ²	≈0.511 MeV/c ²	≈105.66 MeV/c ²	≈1.7768 GeV/c ²
charge	2/3	2/3	2/3	-1	-1	-1
spin	1/2	1/2	1/2	1/2	1/2	1/2
QUARKS	up	charm	top	electron	muon	tau
	≈4.7 MeV/c ²	≈96 MeV/c ²	≈4.18 GeV/c ²	<2.2 eV/c ²	<1.7 MeV/c ²	<15.5 MeV/c ²
	-1/3	-1/3	-1/3	0	0	0
	1/2	1/2	1/2	1/2	1/2	1/2
LEPTONS	down	strange	bottom	electron neutrino	muon neutrino	tau neutrino

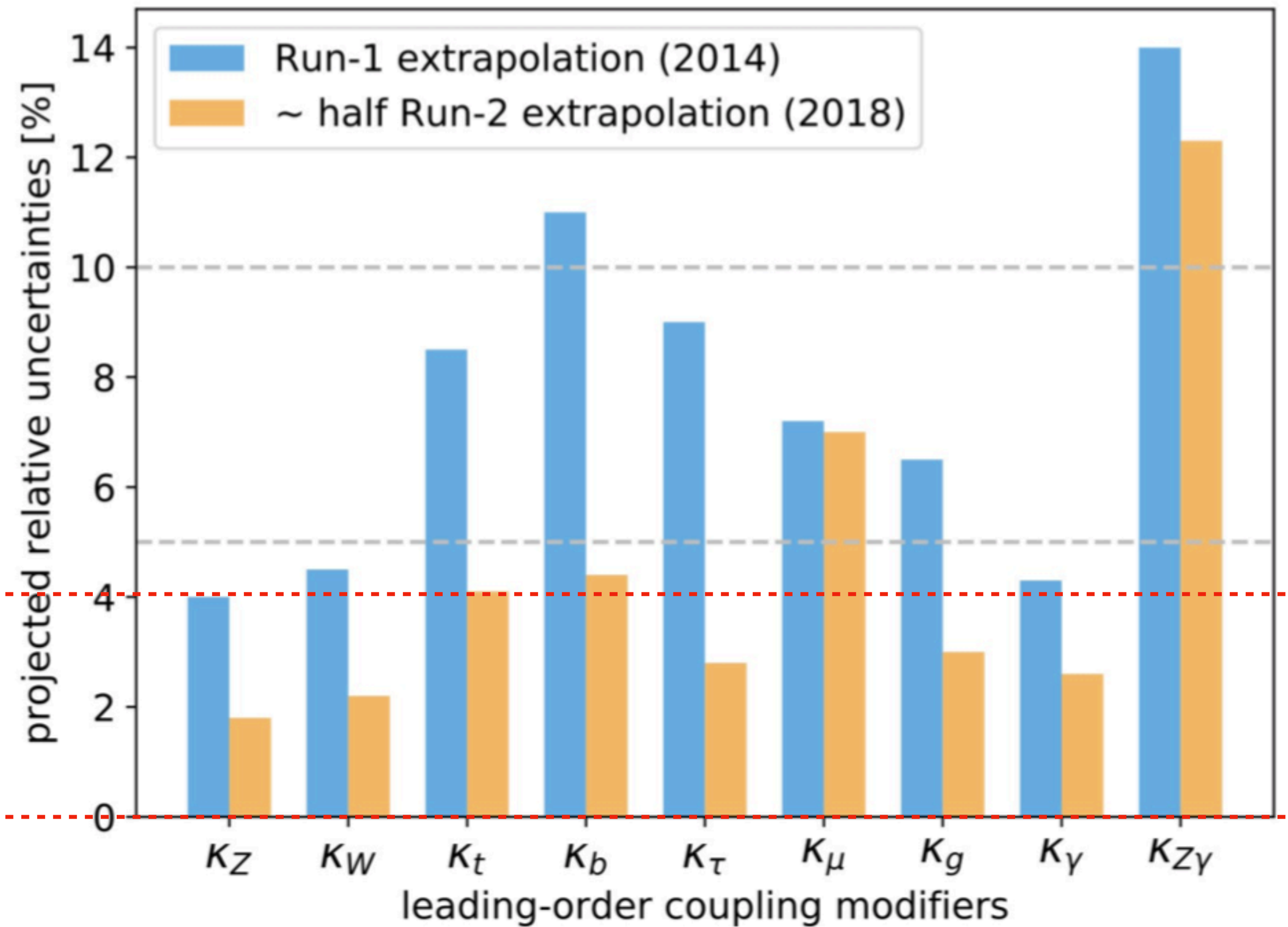
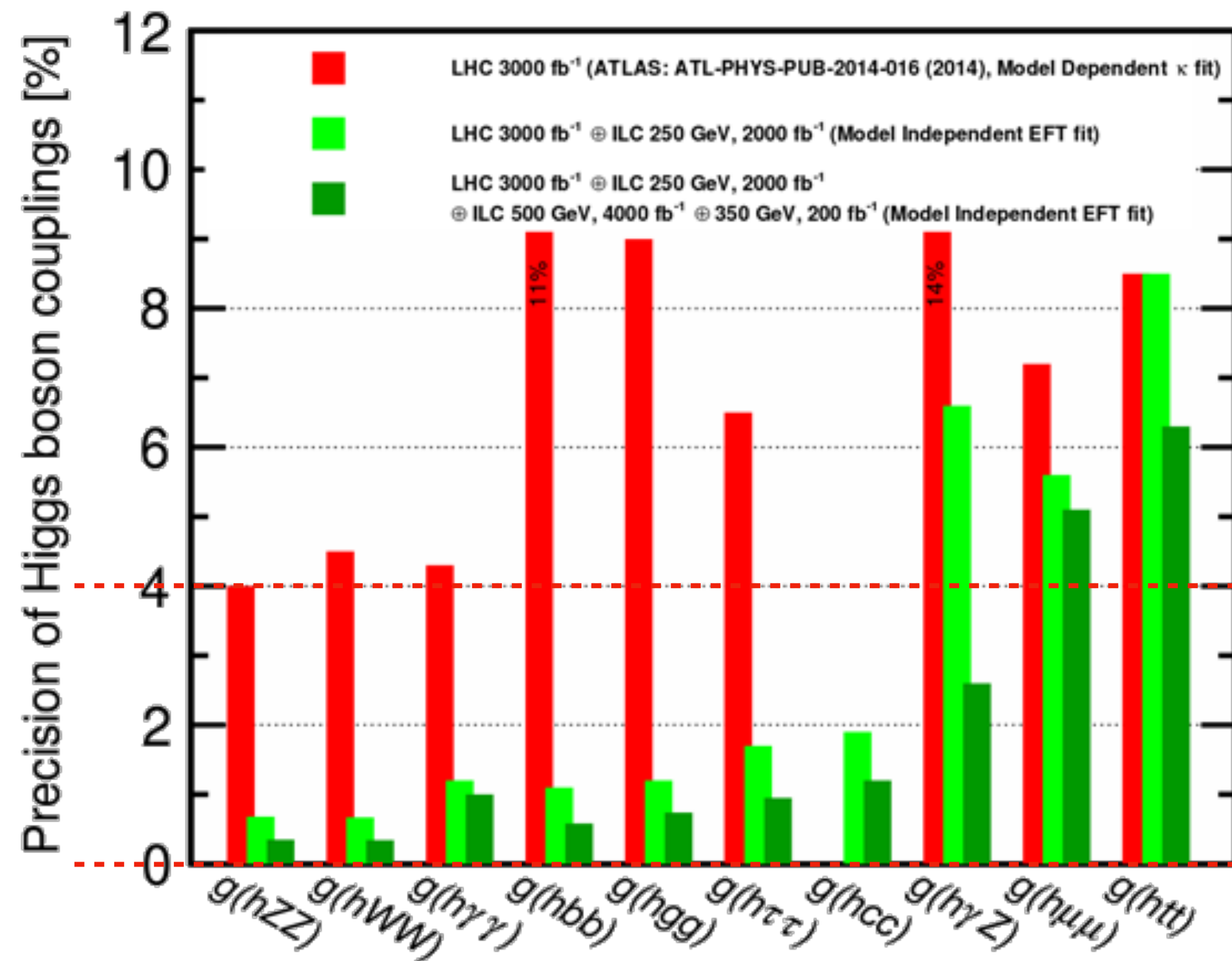
2018



HIGH PRECISION HIGGS

HL-LHC versus ILC

- ECFA workshop started to compare



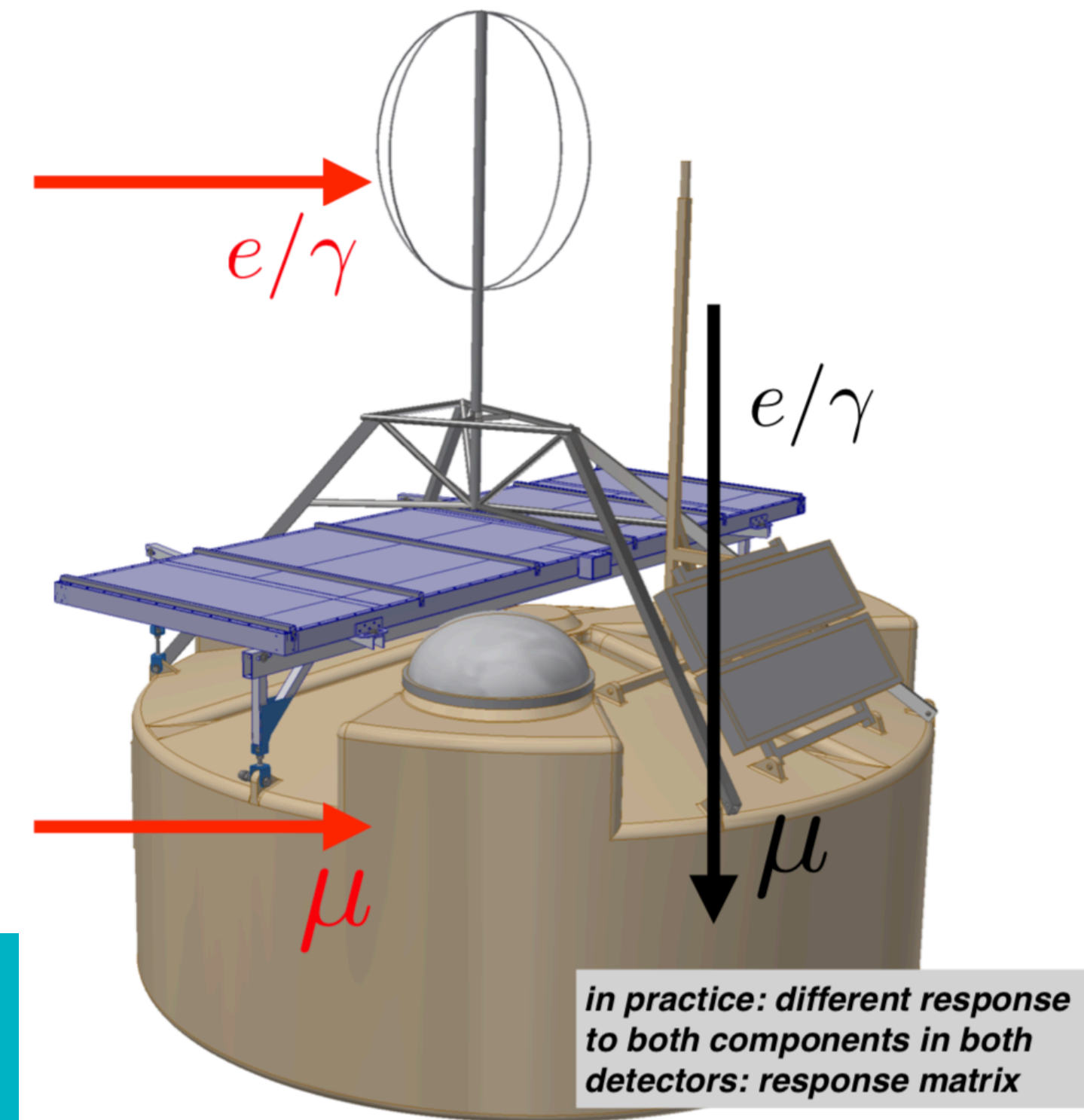
COSMIC RAYS

Highest energetic particle types in Auger

- Radio antenna's
 - The NL group pioneered and established the radio detection of air showers
- Upgrade of Auger
 - Production of Scintillator Detectors

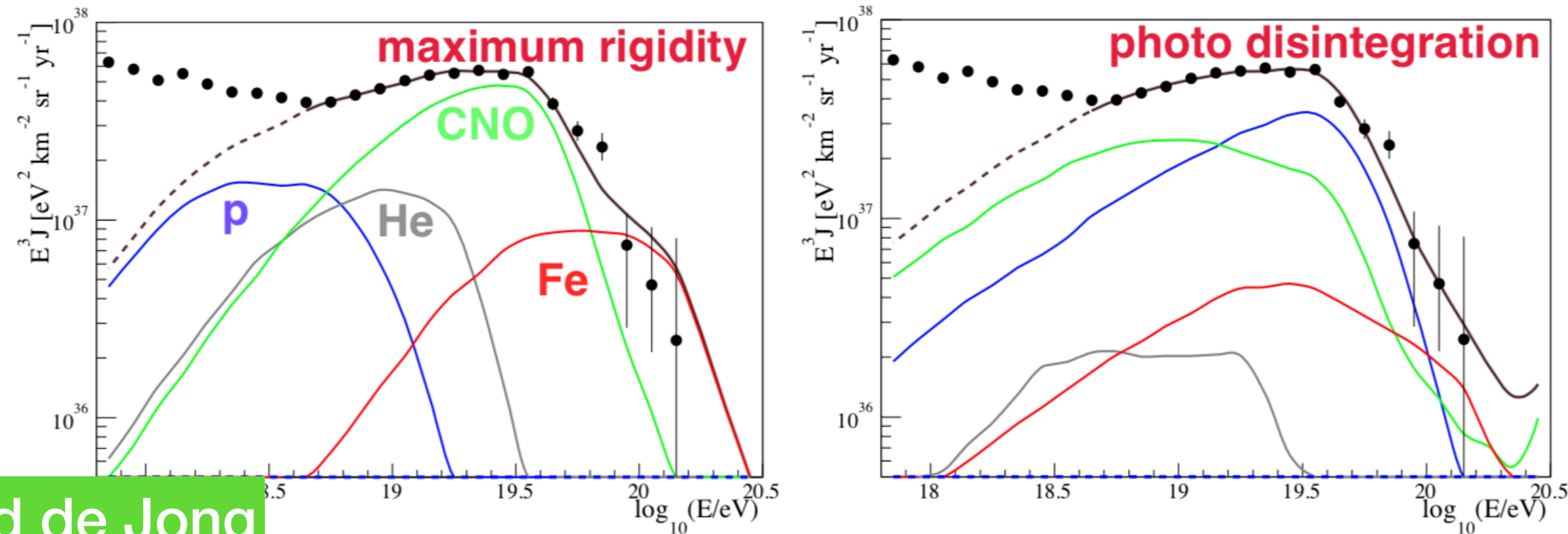
Funding very successful in 2018

- Hardware investment:
 - 3.5 M € aERC Grant Hörandel, Auger radio upgrade, 2018
 - 2.5 M € NWO-Groot, Auger radio upgrade, 2018
 - 450 k € Nikhef mission, Auger scintillator upgrade (SSD)

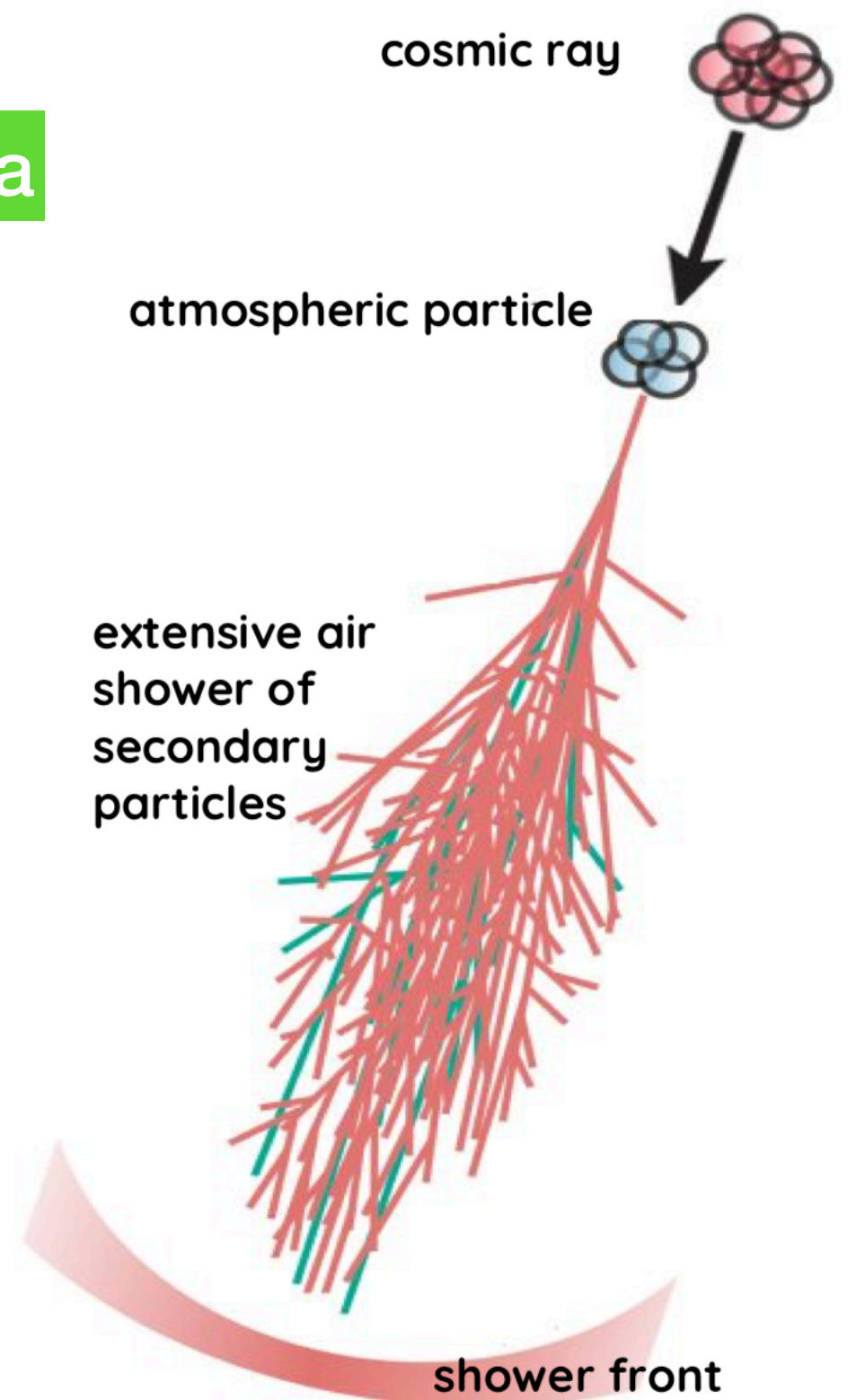


UHECR - AUGER

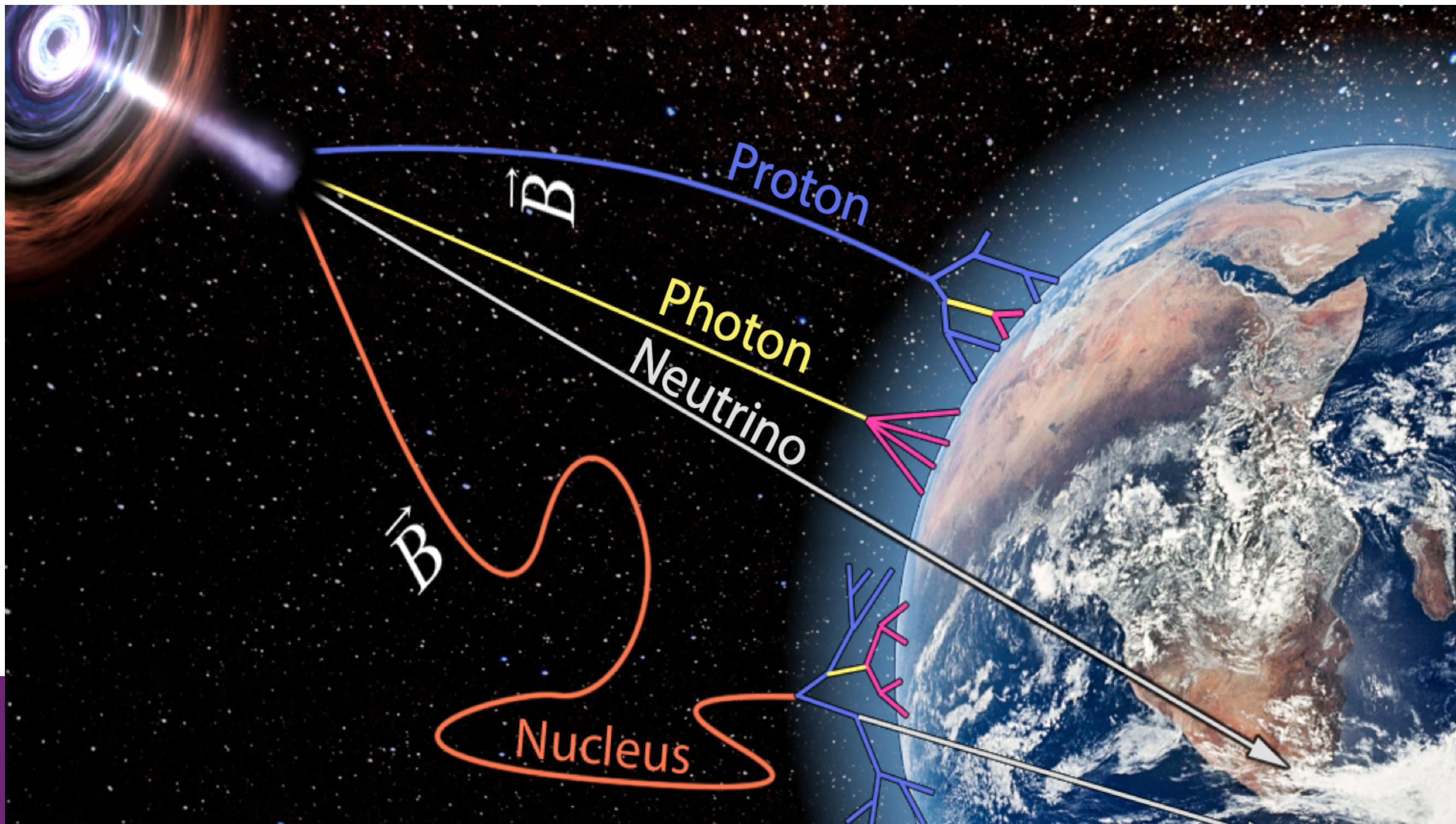
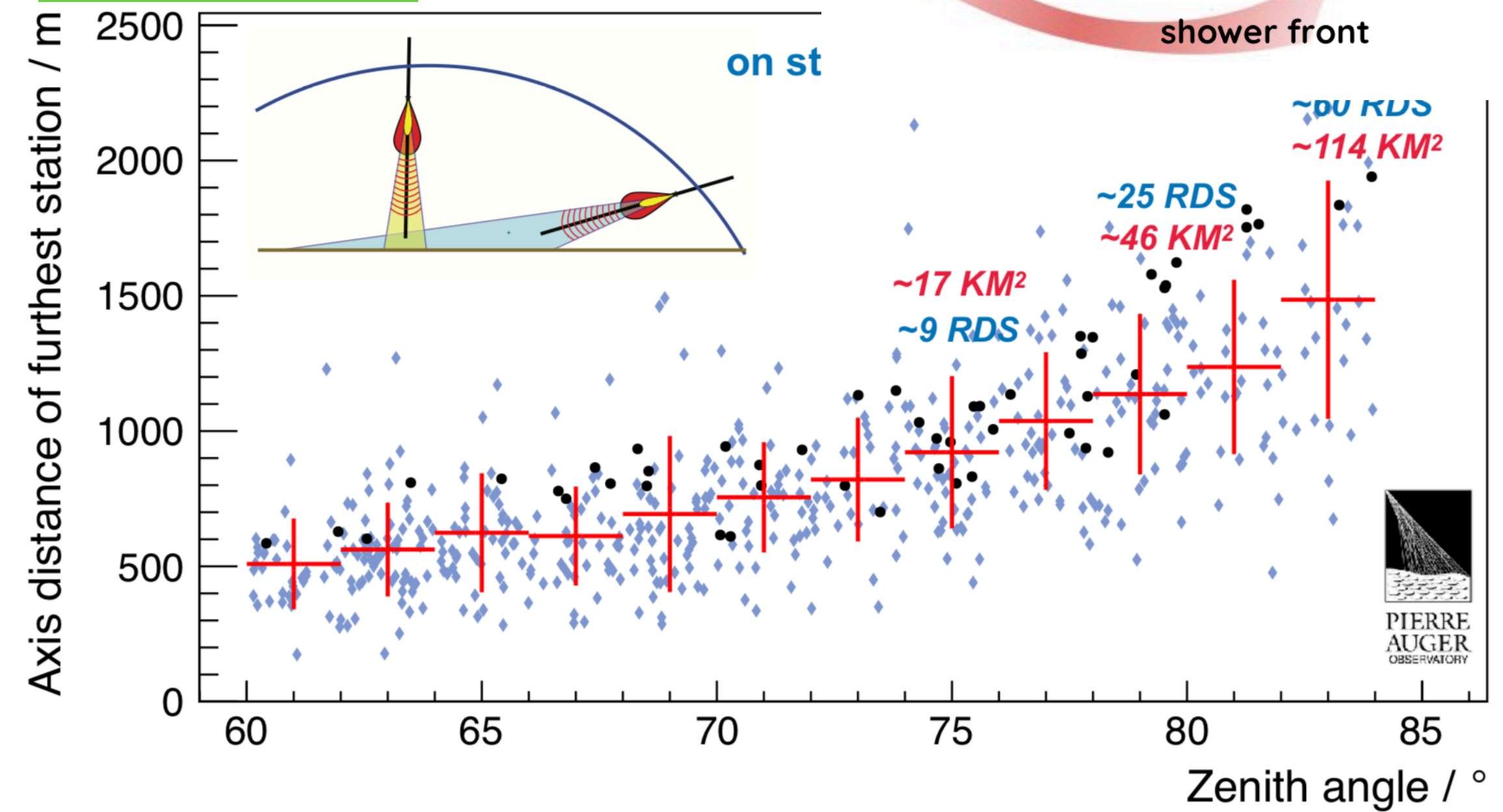
Fabrizia Canfora



Sijbrand de Jong



Jorg Horandel



THEORY

NIKHEF THEORY GROUP AMSTERDAM: LEADERSHIP

- Head of the group from 2005-2018:

Eric Laenen

- Largely shaped the current Nikhef theory group
- Initiated collaborations within our community
- Conducted two FOM programmes
- Stimulated also a lot of further success in acquiring external funding (FOM, NWO, ERC grants, ...)

➔ *Many thanks to Eric!*

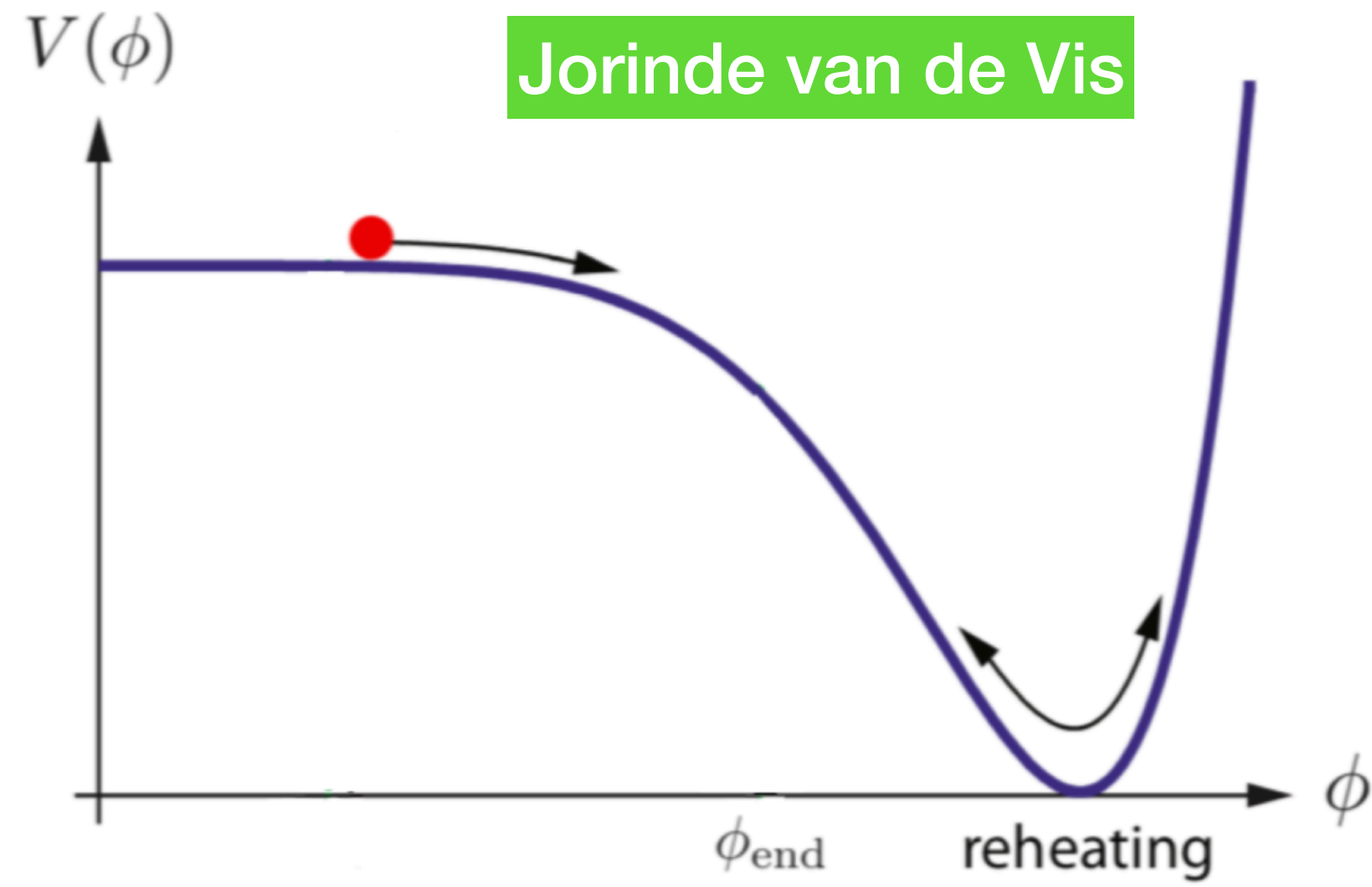


- Since September 2018: R.F.

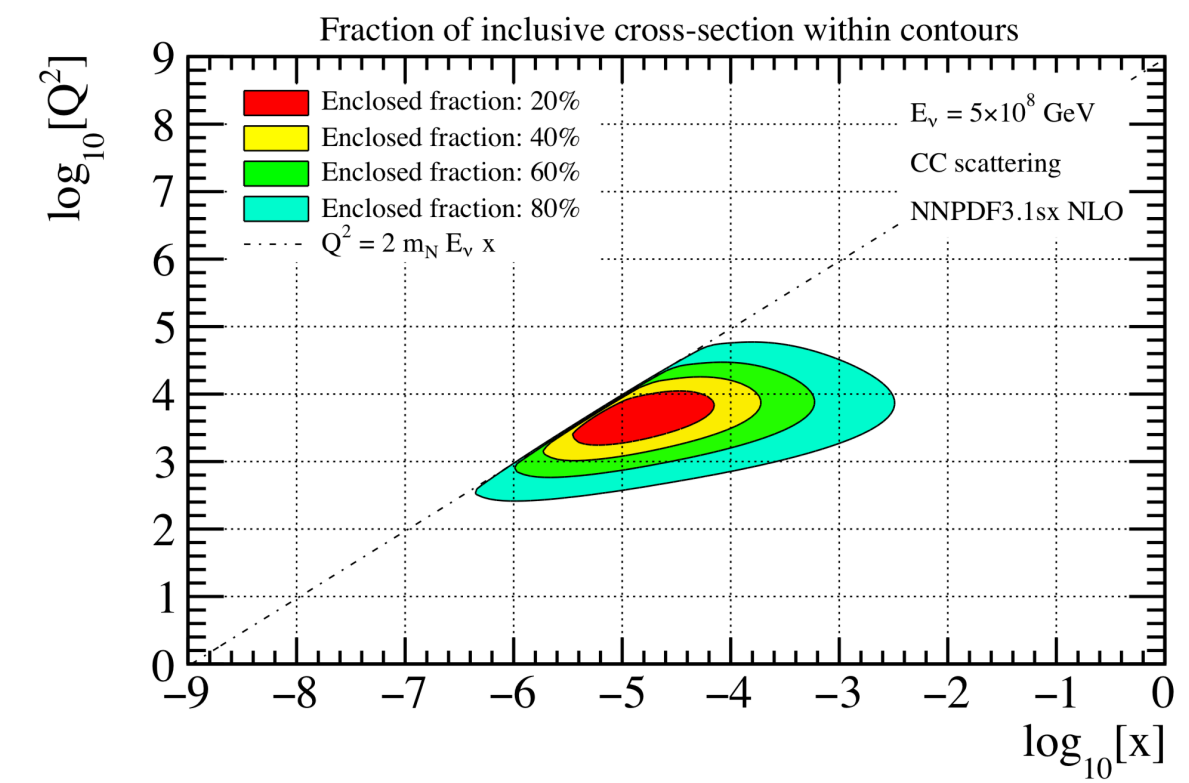
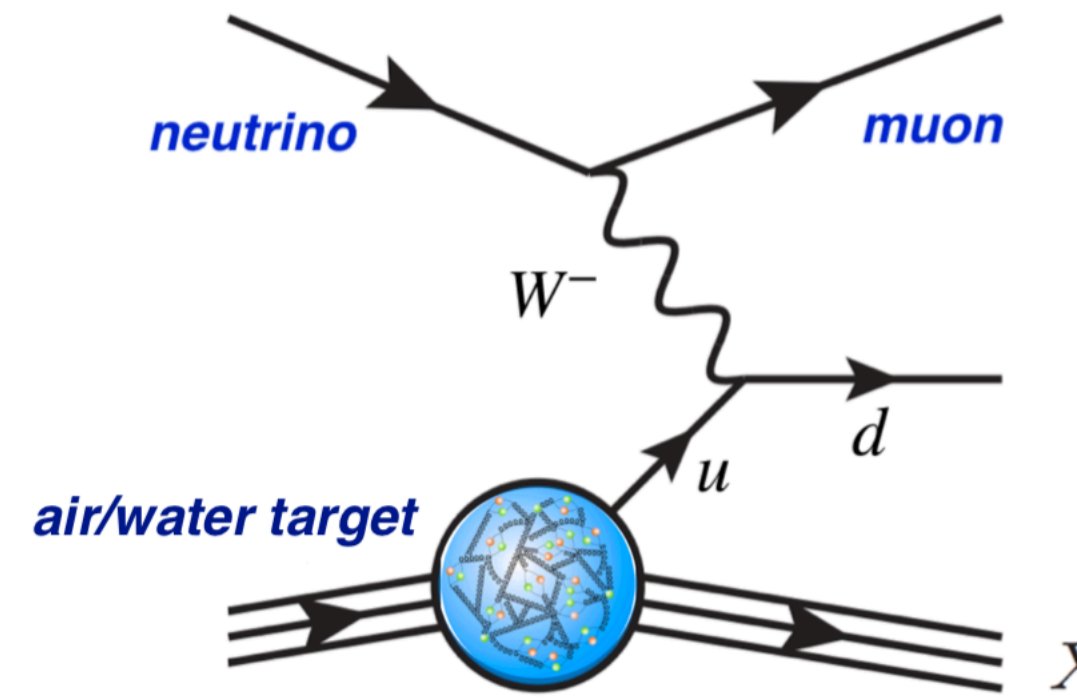
Thank you for all your contributions, Eric!



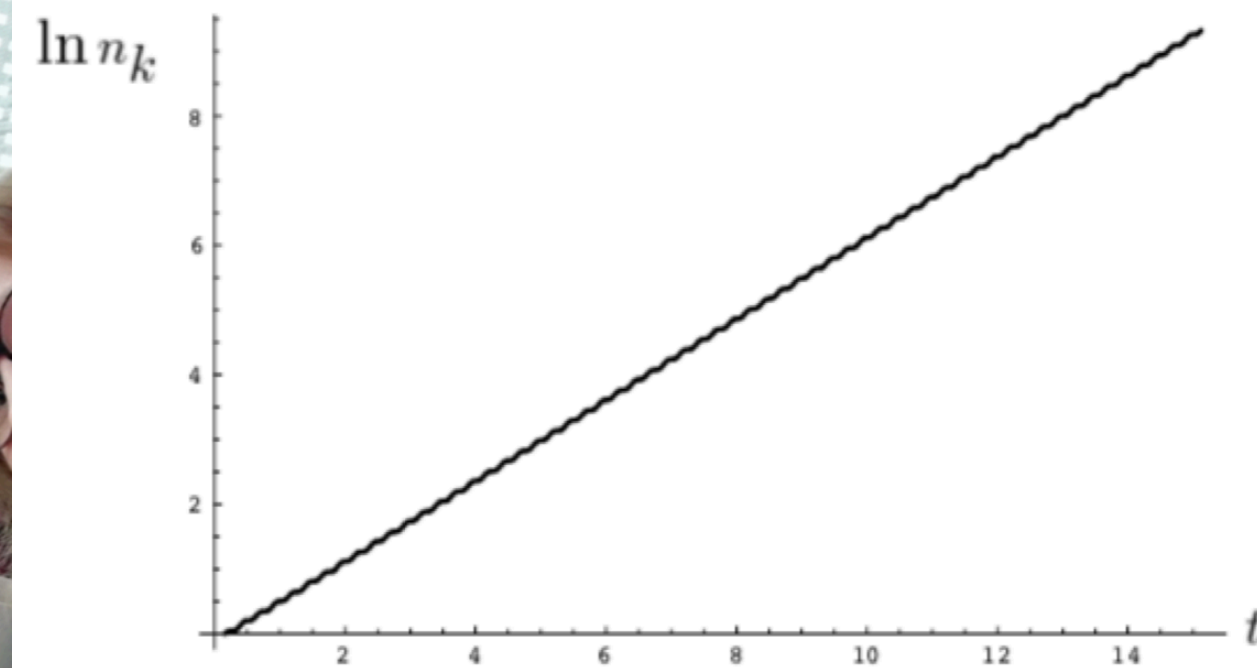
THEORY - COSMOLOGY AND EXPERIMENT



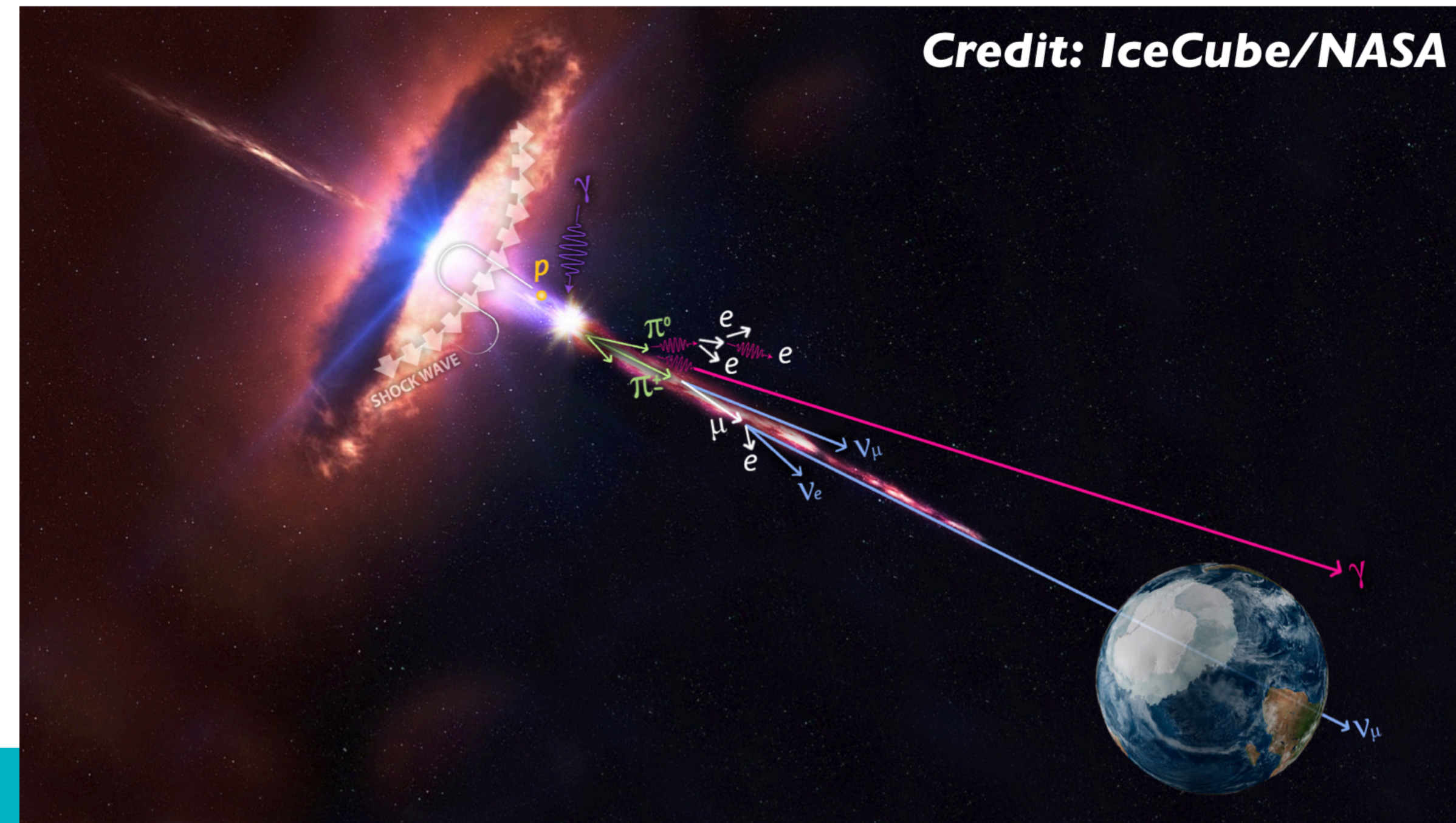
Jorinde van de Vis



Rhorry Gauld



Bogumita Swiezewska



Credit: IceCube/NASA

GRAVITATIONAL WAVES, DARK MATTER, COMPUTING

You have seen the talks this afternoon...

- Virgo: Lot of effort to join the O3 run in 2019
- Einstein Telescope: Big ambitions in Eindhoven-Leuven-Aachen triangle
- Dark Matter: Extending the search regions
- XAMS: A good place for newcomers
- Computing: The essence

2018: A REMARKABLE YEAR - DEEP DOWN AND UPS

2018: A REMARKABLE YEAR - DEEP DOWN AND UPS

André Mischke
Els Koffeman
Joris van Heijningen
Niels van Bakel

Tot ons verdriet is veel te vroeg overleden mijn lieve man, mijn vader,
mijn zoon, schoonzoon, broer, zwager

André Mischke

* Niebüll, 11 januari 1972

† Utrecht, 8 november 2018

André was een gedreven persoonlijkheid met een
veelzijdige belangstelling, een inspiratiebron voor velen.

Anna von der Heydt - Mischke
Julia Mischke
Familie Mischke
Familie von der Heydt

De herdenkingsbijeenkomst vindt plaats op zaterdag 24 november om
11.00 uur in De Landgoederij, Camminghalaan 30, 3981 GH Bunnik.

Tevens is er gelegenheid tot condoleren.

De crematieplechtigheid heeft in besloten familiekring
plaatsgevonden.

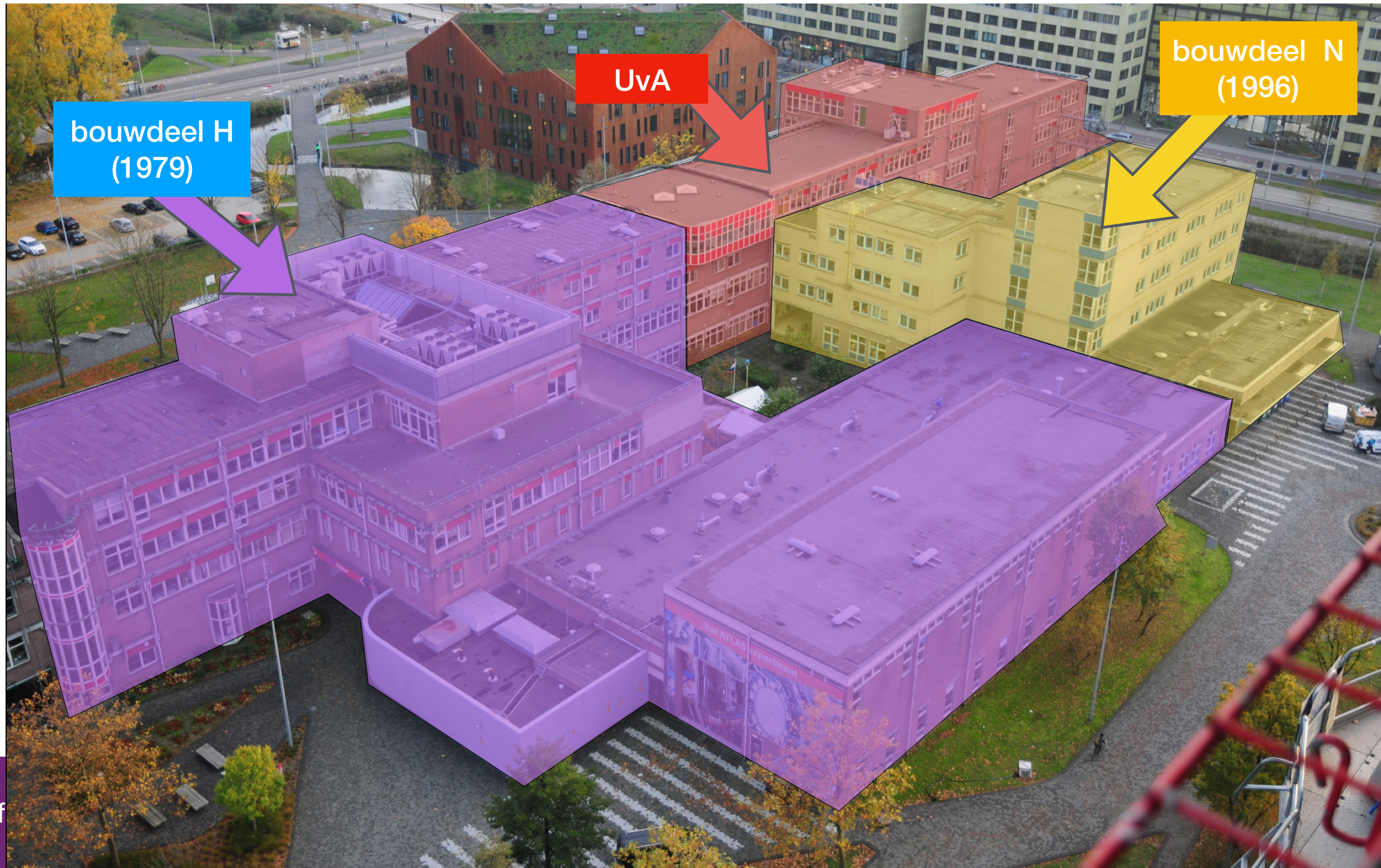


André

1972 - 2018

RENOVATION NIKHEF + EXTENSION DATA CENTRE

NWO has funded the renovation with 26 ME



RENOVATION NIKHEF + EXTENSION DATA CENTRE

NWO has funded the renovation with 26 ME



KM3NET - NEUTRINO'S IN DEEP SEA

National roadmap

- KM3NeT2.0:
Neutrino science in the deep sea
 - 12.7 M€ for infrastructure (2018)
 - Nikhef & NIOZ, TNO, KVI-CART



NWO-BIG INVESTMENT FUNDING - 2018

Gravitational Waves:
the new cosmic messengers

- 3.52 ME

Searching for Ultra-High-Energy
Cosmic-Ray Sources using a
new Detector Concept in the
Pierre Auger Observatory

- 2.5 ME



ET-PATHFINDER

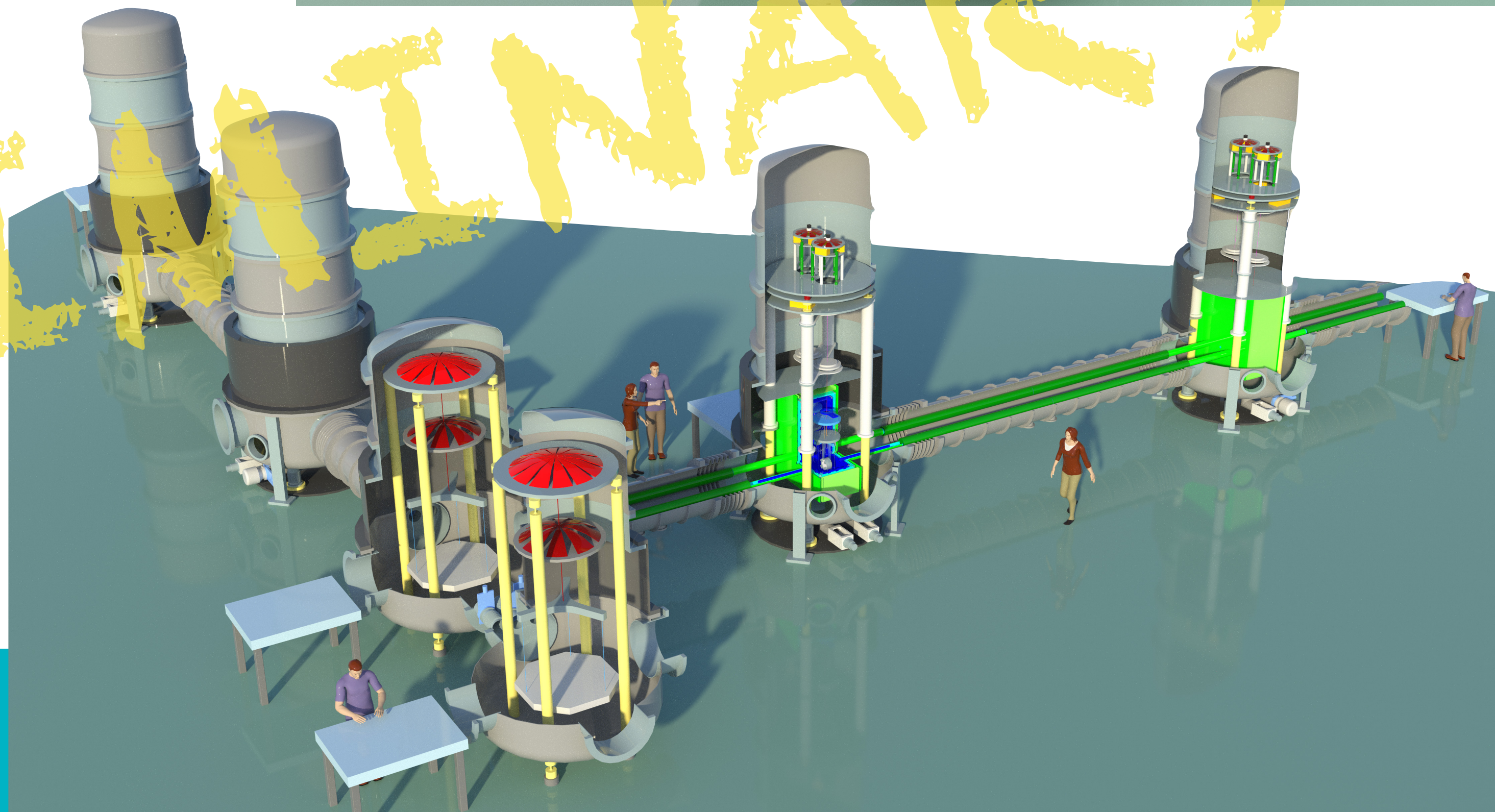
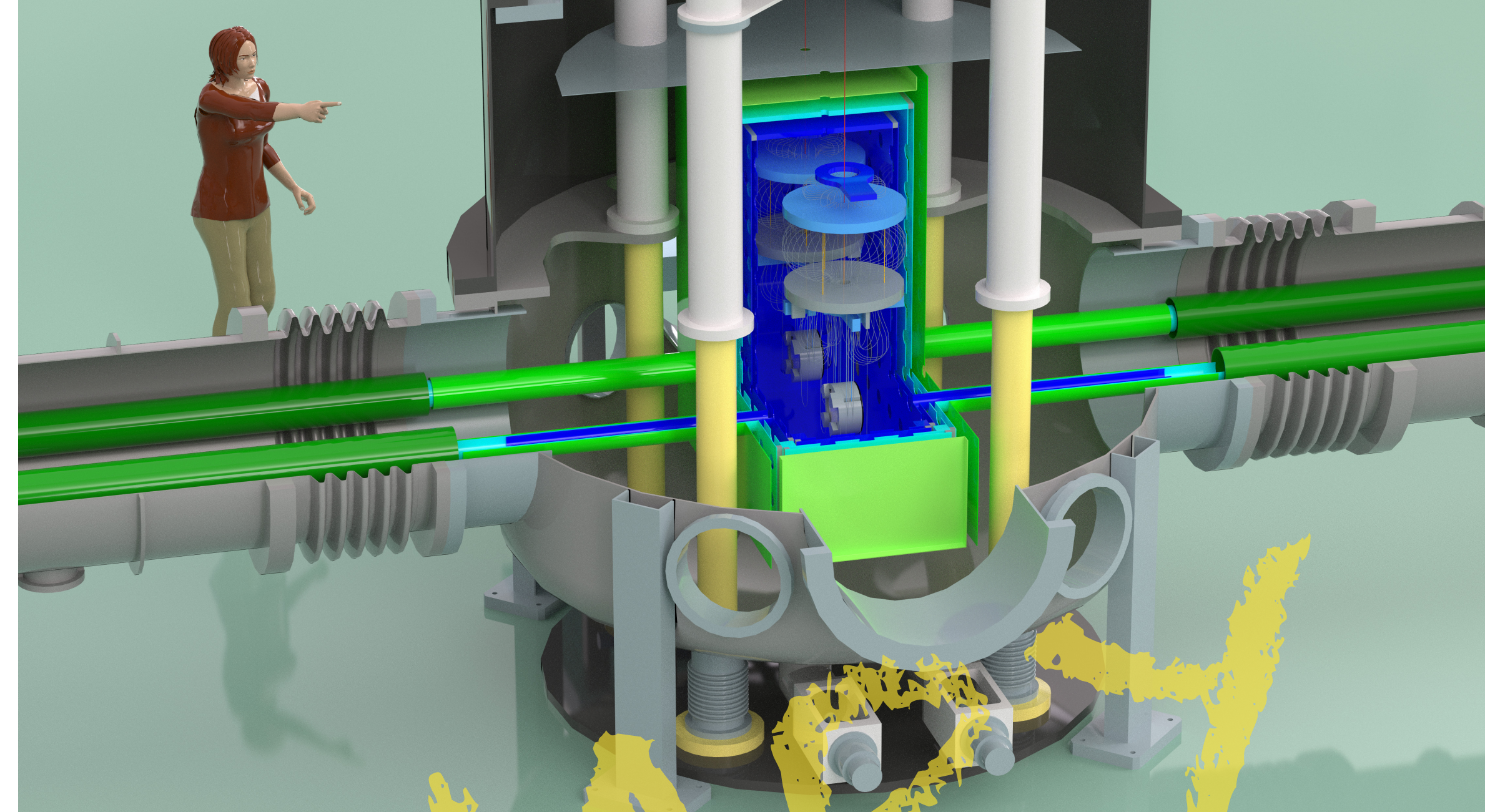
Fascinating R&D project

- Investigating the realism for placing a bid to host ET in NL-B-D

Amazing how this is being funded

- 14.5 ME in total from
 - Interreg
 - Limburg Province
 - OCW
 - EZK
 - Nikhef
 - Partners Belgium

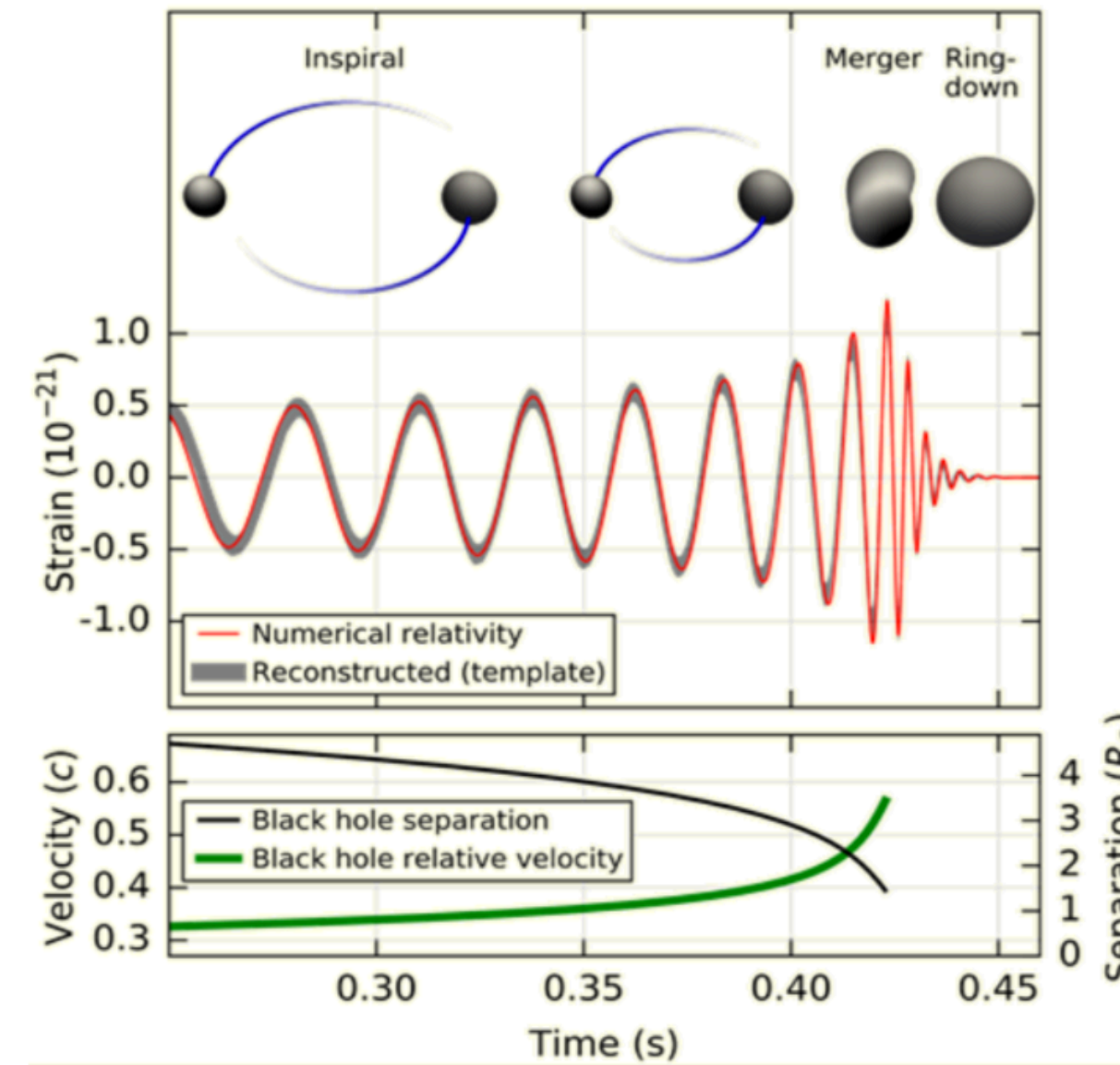
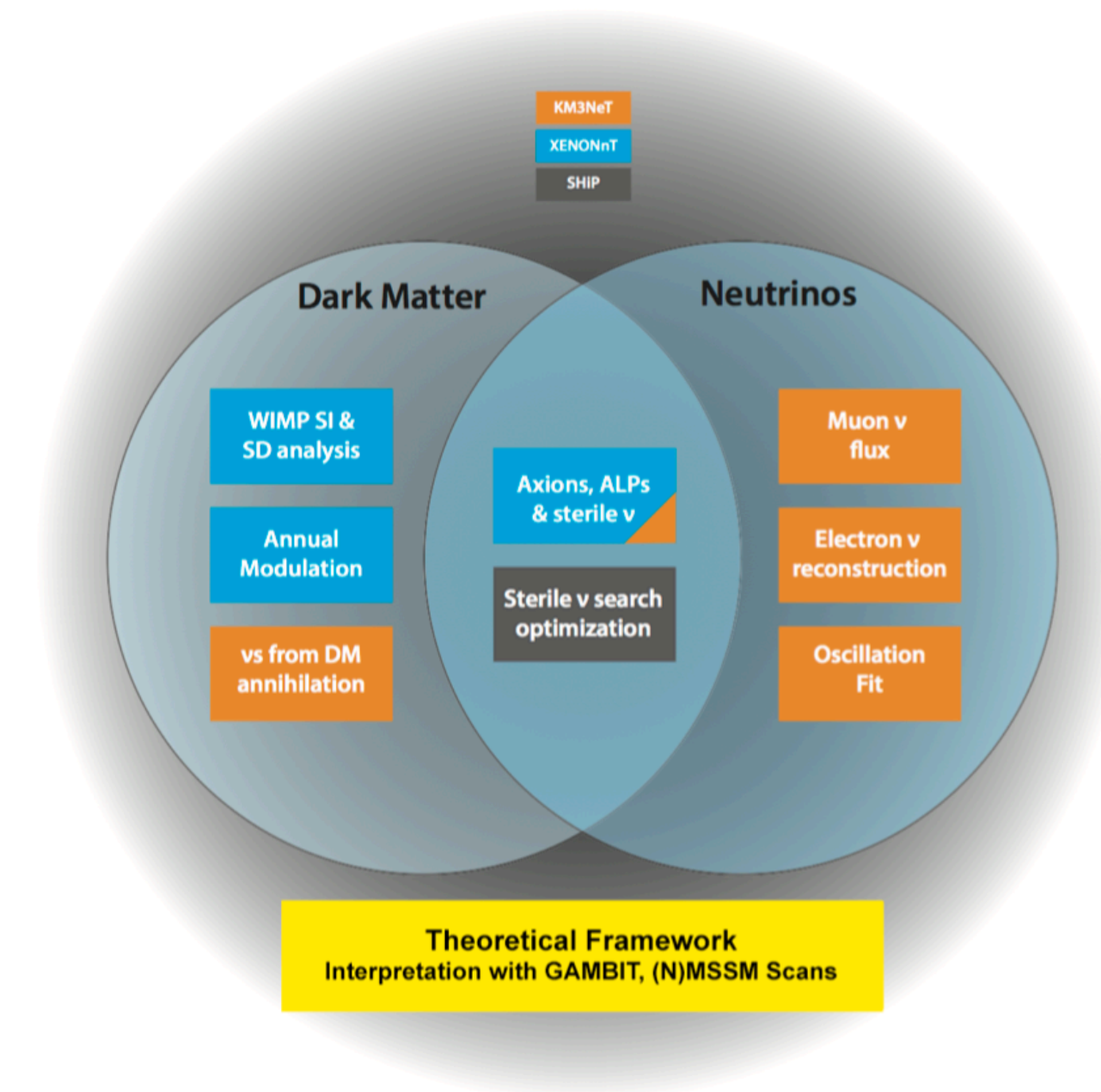
Stay tuned!



PROGRAM FUNDING

Successful NWO ENW programs (news since yesterday)

- The Hidden Universe of Weakly Interacting Particles (KM3NeT en XENON)
 - Paul de Jong - 1.88ME
- Gravitational waves: A new road to fundamental physics, astrophysics and cosmology
 - Frank Linde - 2.51ME



RECFA

Visit to Netherlands

- October 2018

ECFA chair

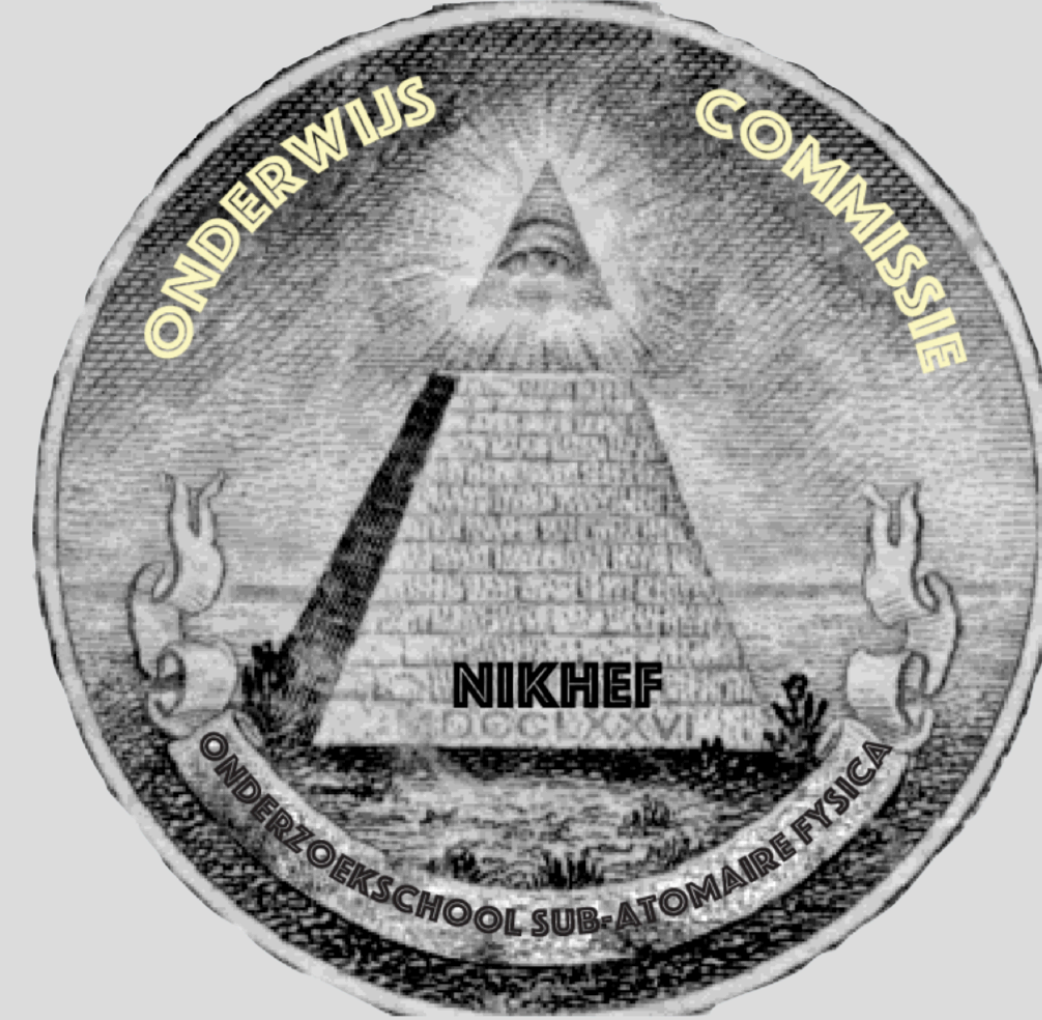
- Congratulations
from
Jorgen D'Hondt



JAMBOREE THEME

- **Provide Feedback and take charge of your PhD program**
 - Education is vital part of Nikhef
 - Talk to the PhD council, your C3 member,
 - BND Schools, NWO courses, supervision, Teaching duties, conferences, visibility,
- **What about post-docs?**

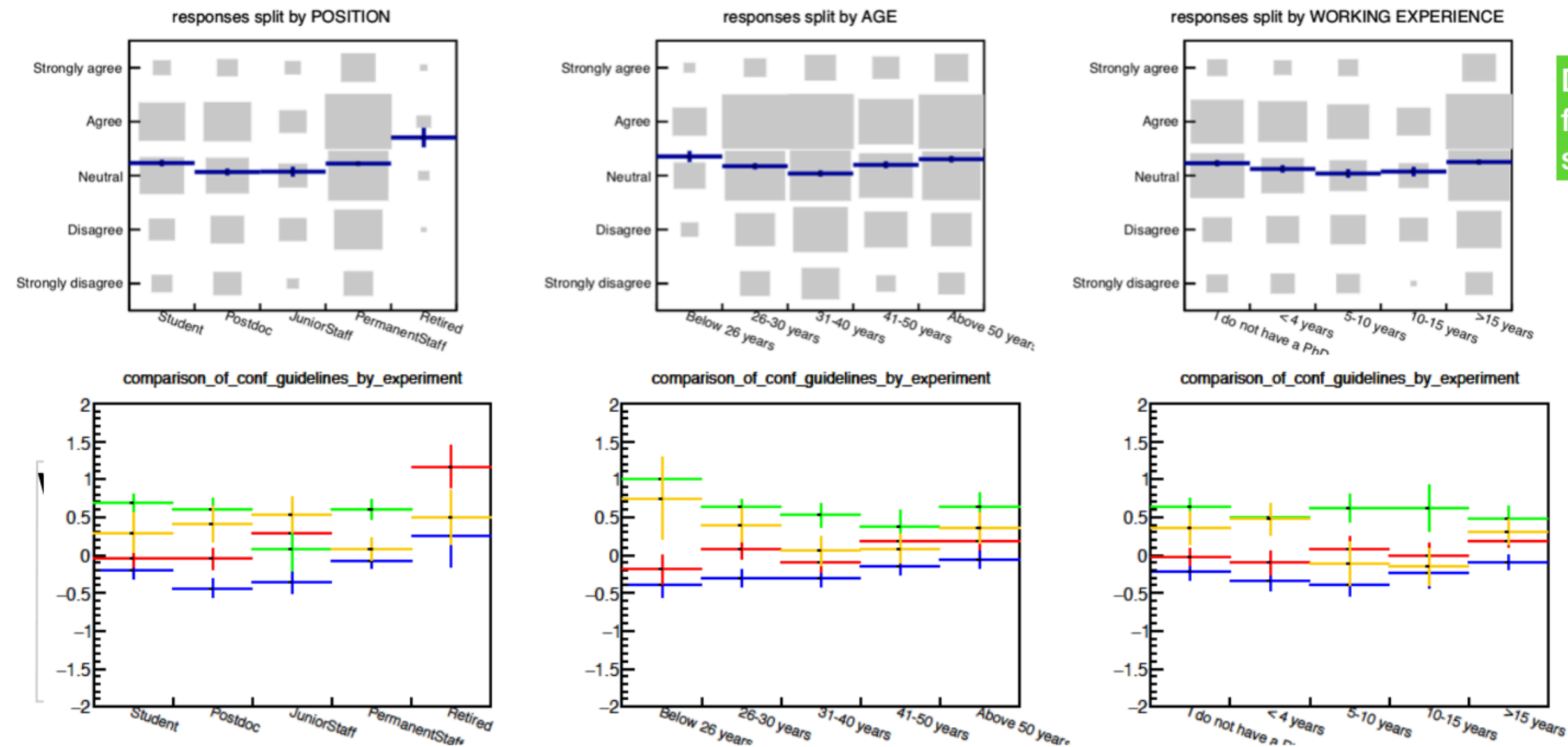
Every respected institution has a secret society



We care about talent!

- Let Nikhef be the place to get inspired
- If not, we have to change things

The collaboration guidelines for speakers at conferences allow me to be creative and demonstrate my talents



Disagreement largest for postdocs and junior staff

Large differences observed between the LHC experiments - for all stages in career

PHD COUNCIL

Excellent initiative

- Happy that the council revived over the last period

- The Nikhef PhD councils aims to improve the experience of the PhD students at Nikhef.
- We form a bridge between the PhD students and the OSAF Education Committee.

CURRENT MEMBERS



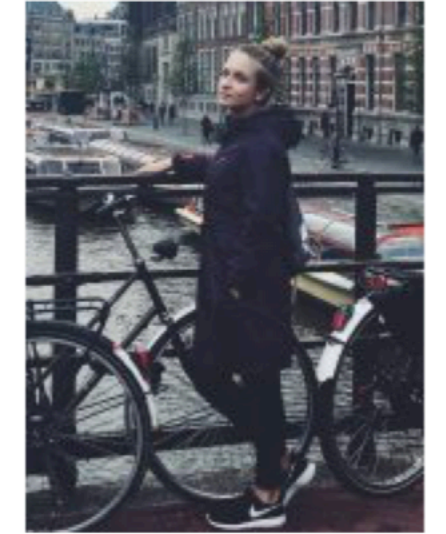
Marc de Beurs
ATLAS | *chair*



Anamika Aggarwal
ATLAS



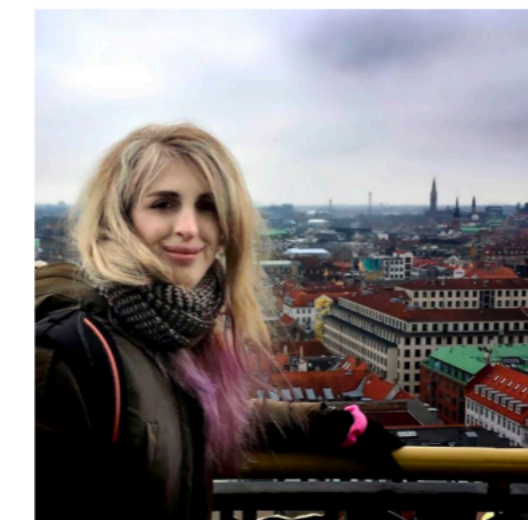
Brían Ó Fearraigh
Neutrino Telescopes



Zhanna Khabanova
ALICE | *secretary*



Maria Bader
Detector R&D



Alice Alfonsi
ATLAS



Ruben Jaarsma
Theory | *webmaster*

Ruben Jaarsma

PHD CAMPAIGNS

Only 4 deadlines for PhD applications

- September 15, 2018
- Januari 15, 2019
- April 15, 2019
- June 15, 2019

Introduce campaigns to get attention

- Social media
- Dedicated to universities

A PHD AT NIKHEF

Are you fascinated by elementary particles, gravitational waves or what happened directly after the big bang? As a PhD student at Nikhef, you will work to become a professional and international researcher specialised in (astro)particle physics. After completion, you can continue working as a scientist in The Netherlands or abroad, but you can also start working in a different field.

All-round international development
During the four year PhD programme, you do research and are part of one of the Nikhef research groups. A large part of this research is done in international collaboration, for example at CERN or in laboratories in Italy, France or Argentina. You are also part of the research school for subatomic physics, attend lectures and present your own research at international conferences.

More information
Want to know more about the procedure, vacancies or where Nikhef PhD students end up after graduation?
Visit www.nikhef.nl/phdpositions

APPLY FOR A PHD POSITION
Nikhef has openings for PhD students four times a year. Deadlines for applications are:

- 15 September 2018
- 15 January 2019
- 15 April 2019
- 15 June 2019

Vacancies can be found one month before the closure date at the latest.

Nikhef

CAMPAIGNS ON E.G. SOCIAL MEDIA

Attract technical skilled people to CERN via short term internships

Nikhef communications created a number of 'testimonials' from Dutch students at CERN

- Dedicated campaigns started
- Help from CERN appreciated



Eric Laenen, Patrick Werneke, Melissa van der Sande

- <https://www.nikhef.nl/jobs/technische-stages-cern/>

THE STUDENT'S
PERSPECTIVE

MELISSA VAN BEEKVELD & TIM WOLF

WHO ARE WE?

Melissa van Beekveld (PhD Nikhef/Radboud University)

- Resummation techniques in QCD
- SUSY dark matter
- Active in teaching and outreach



Tim Wolf (PhD Nikhef/University of Amsterdam)

- Flavour tagging in the ATLAS experiment
- Statistical interpretation of data
- Higgs boson-top quark interaction



WHAT DO YOU LIKE & DISLIKE?

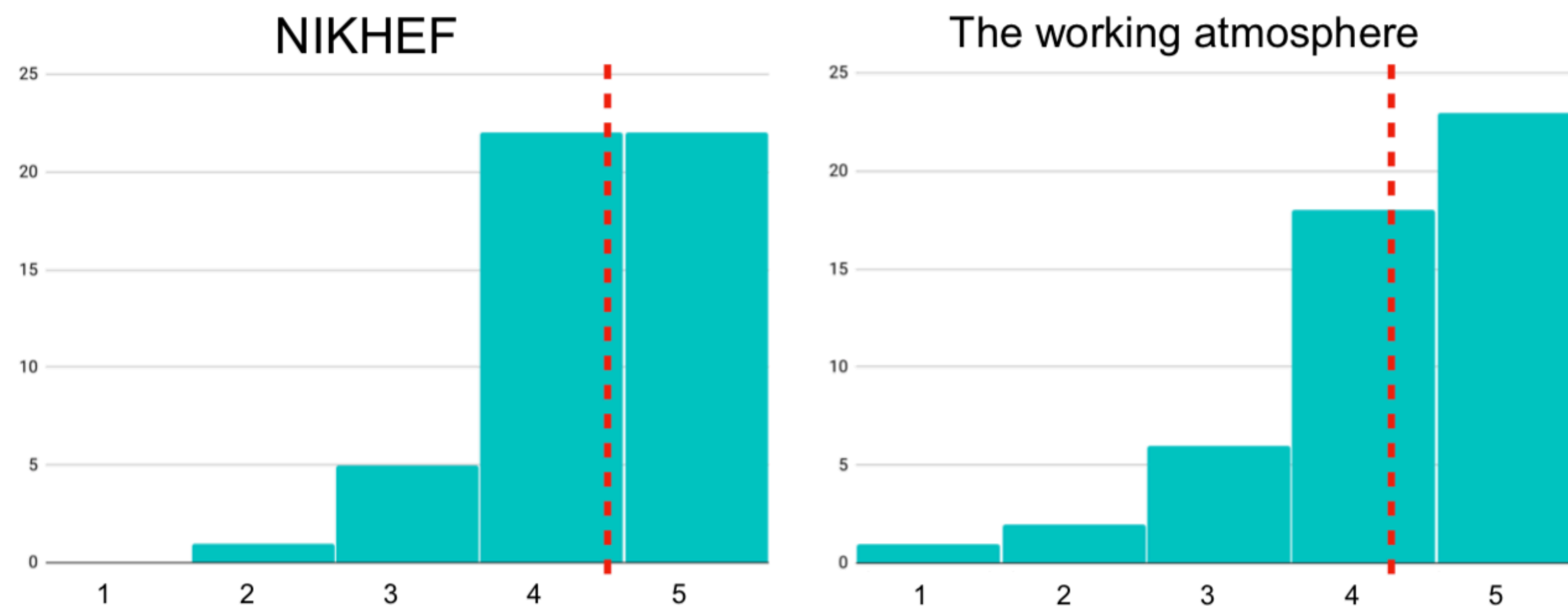


research
work possibility
working
doing problems
learn travel solve
freedom
interesting international challenging
knowledge
physics opportunities
people



insecure
deadlines
slow uncertainty
two-body-problem difficult
prospects overload imposter stuck
pressure
traveling stress
too-much freedom overwhelmed
depression

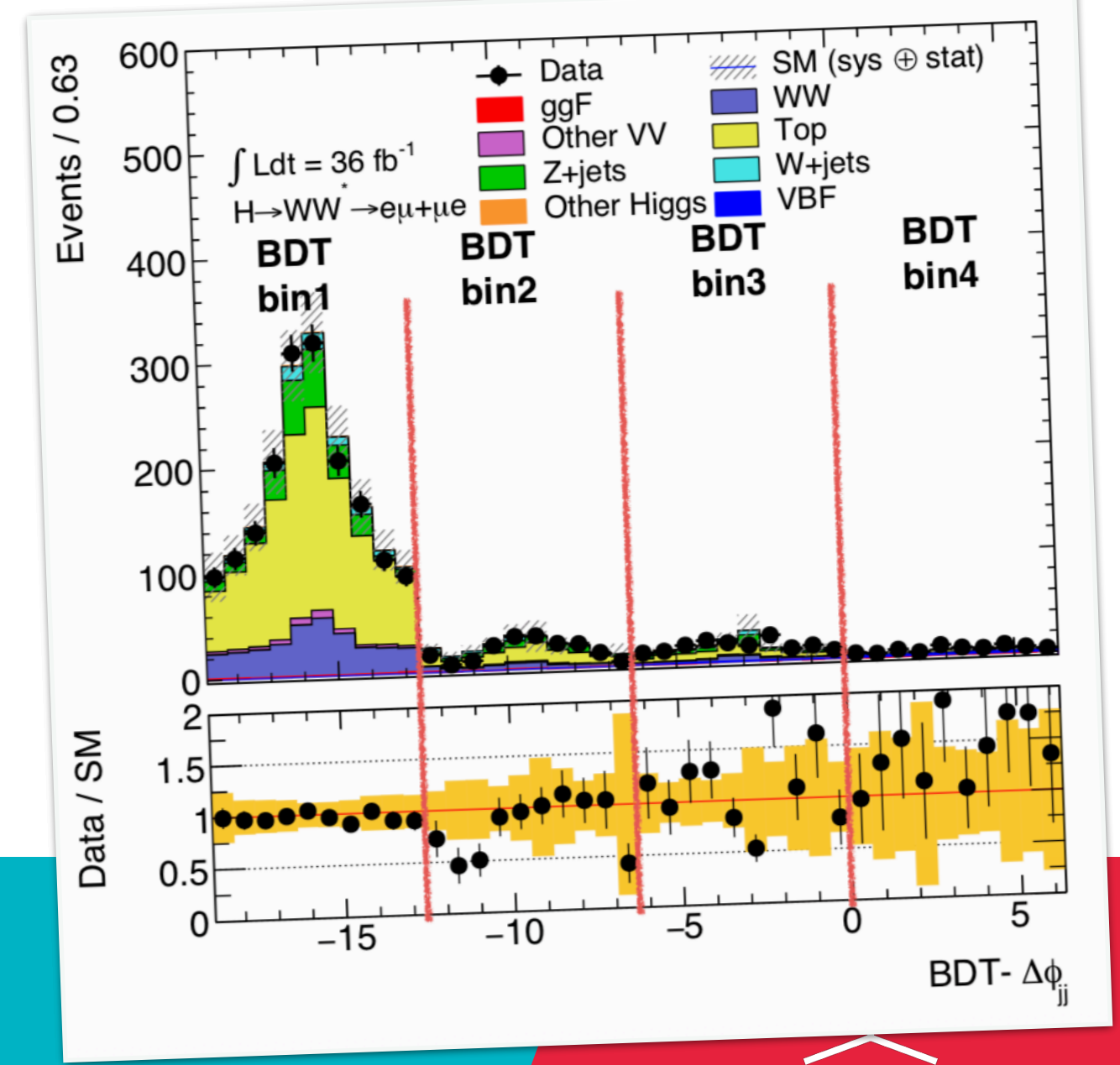
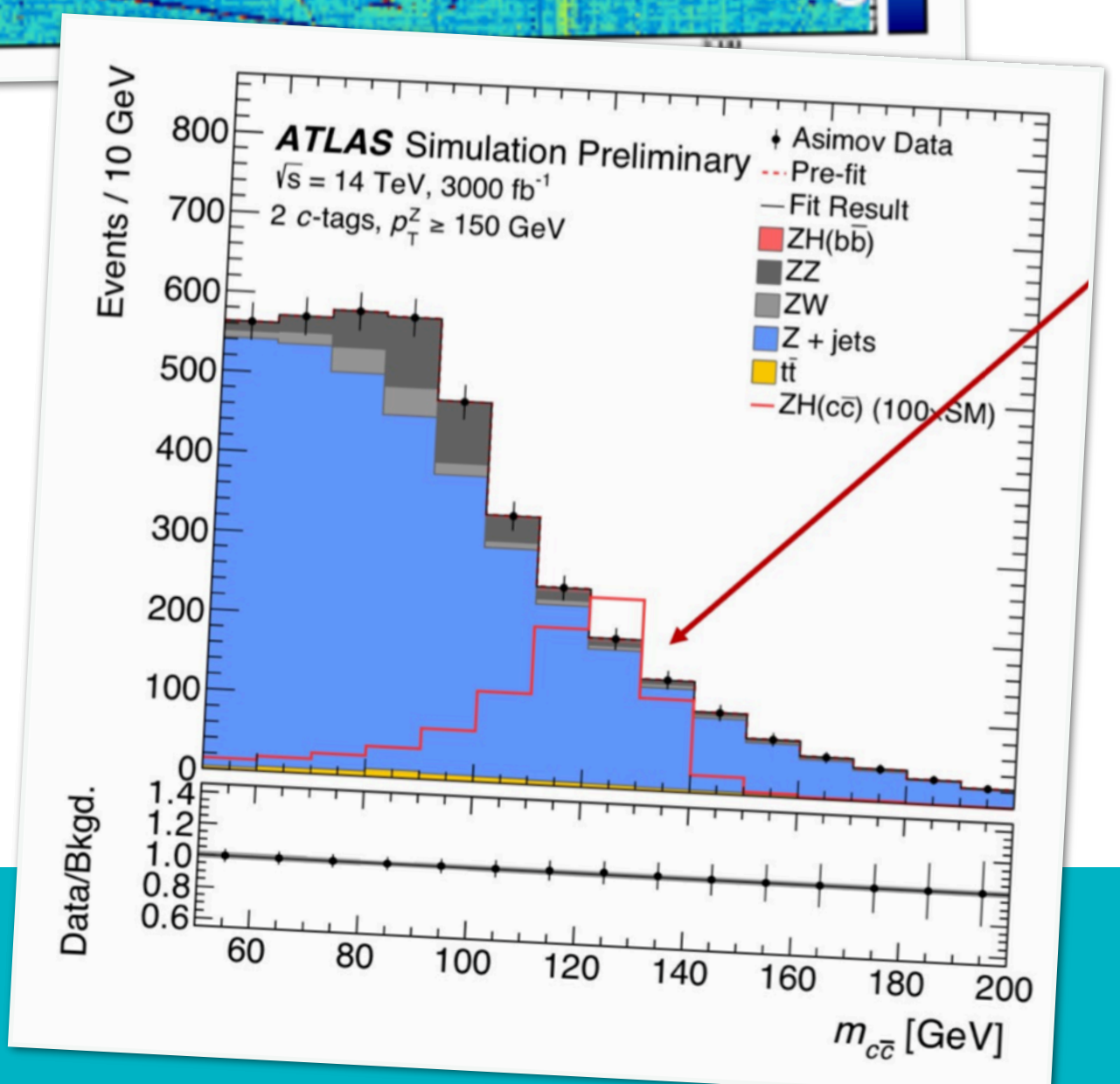
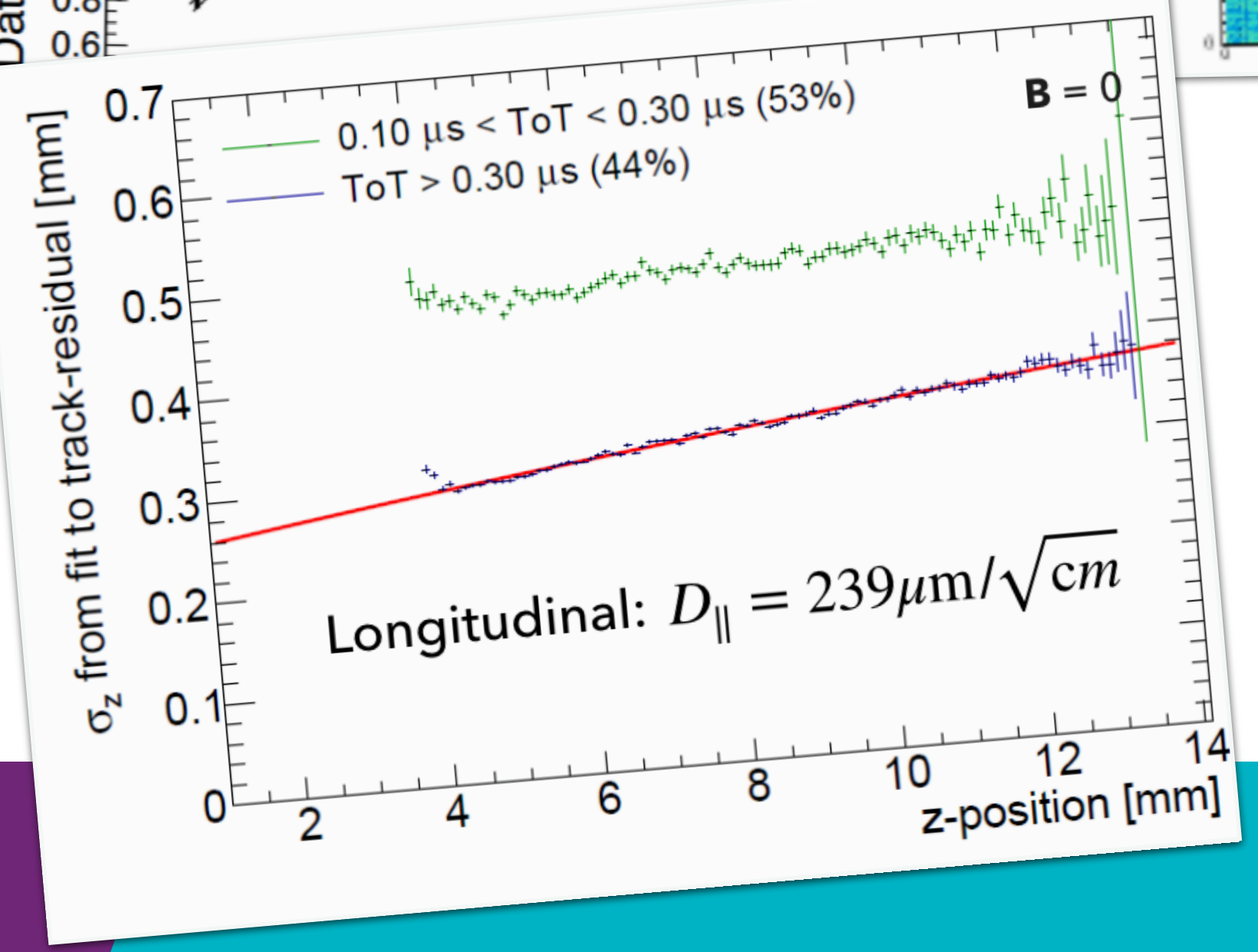
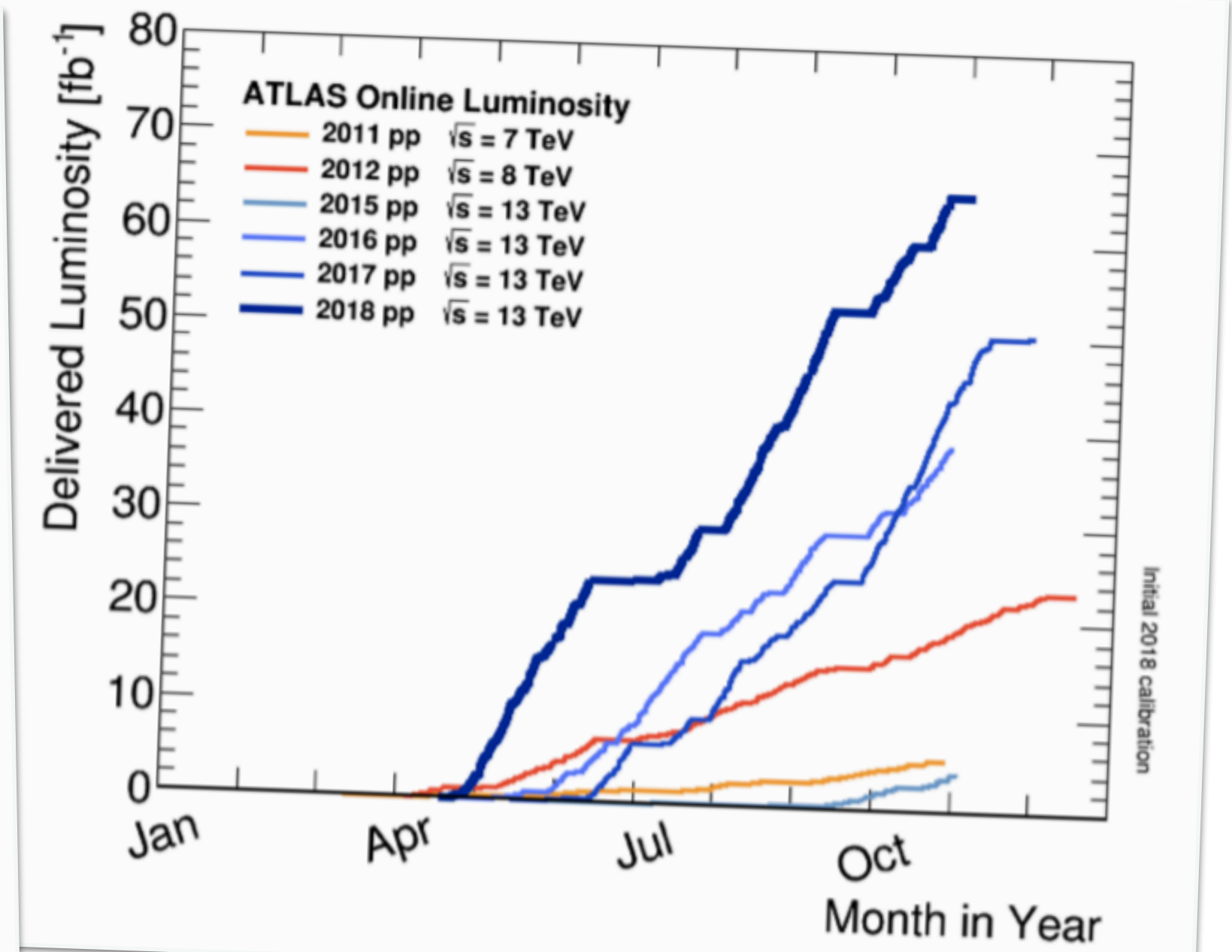
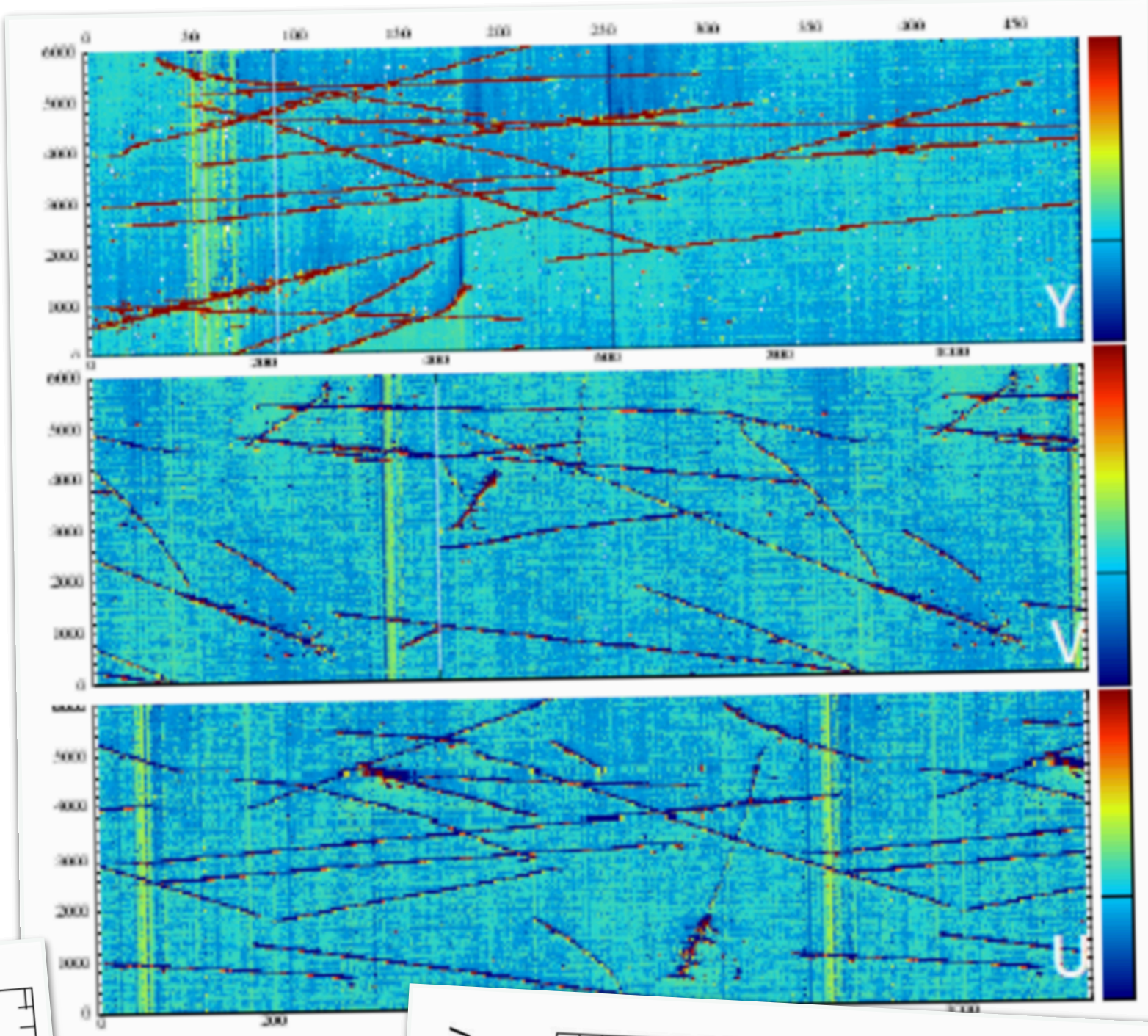
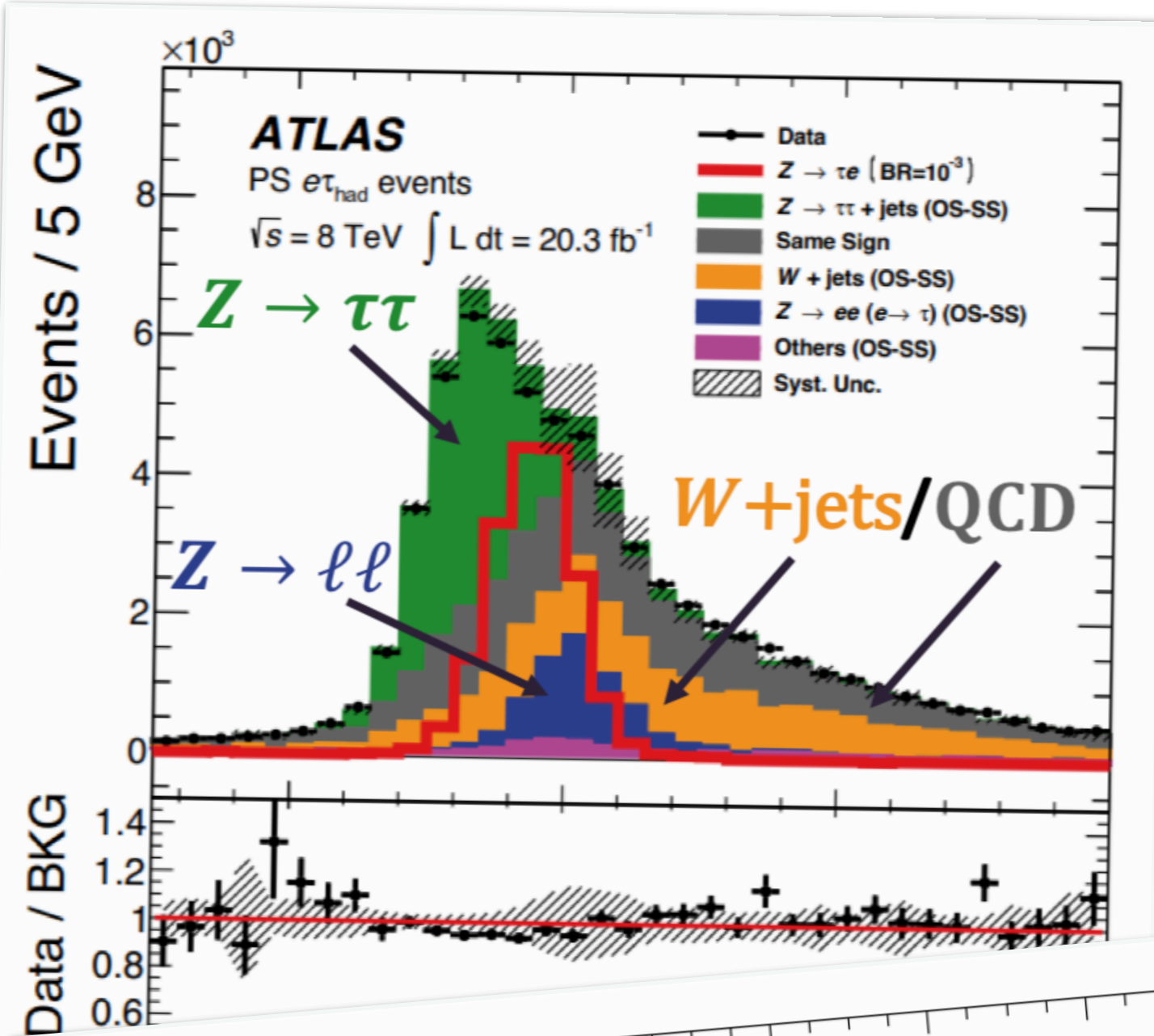
HOW SATISFIED ARE YOU WITH...



CONCLUSIONS

- PhD students are generally happy
- Nikhef is a good place that fosters talent
- Supervision should be strengthened in some aspects
- Make sure that talent is kept in the field
- **Pressure, stress, and uncertainty of the future** are the prime downsides of the job

ENJOY THE DATA!

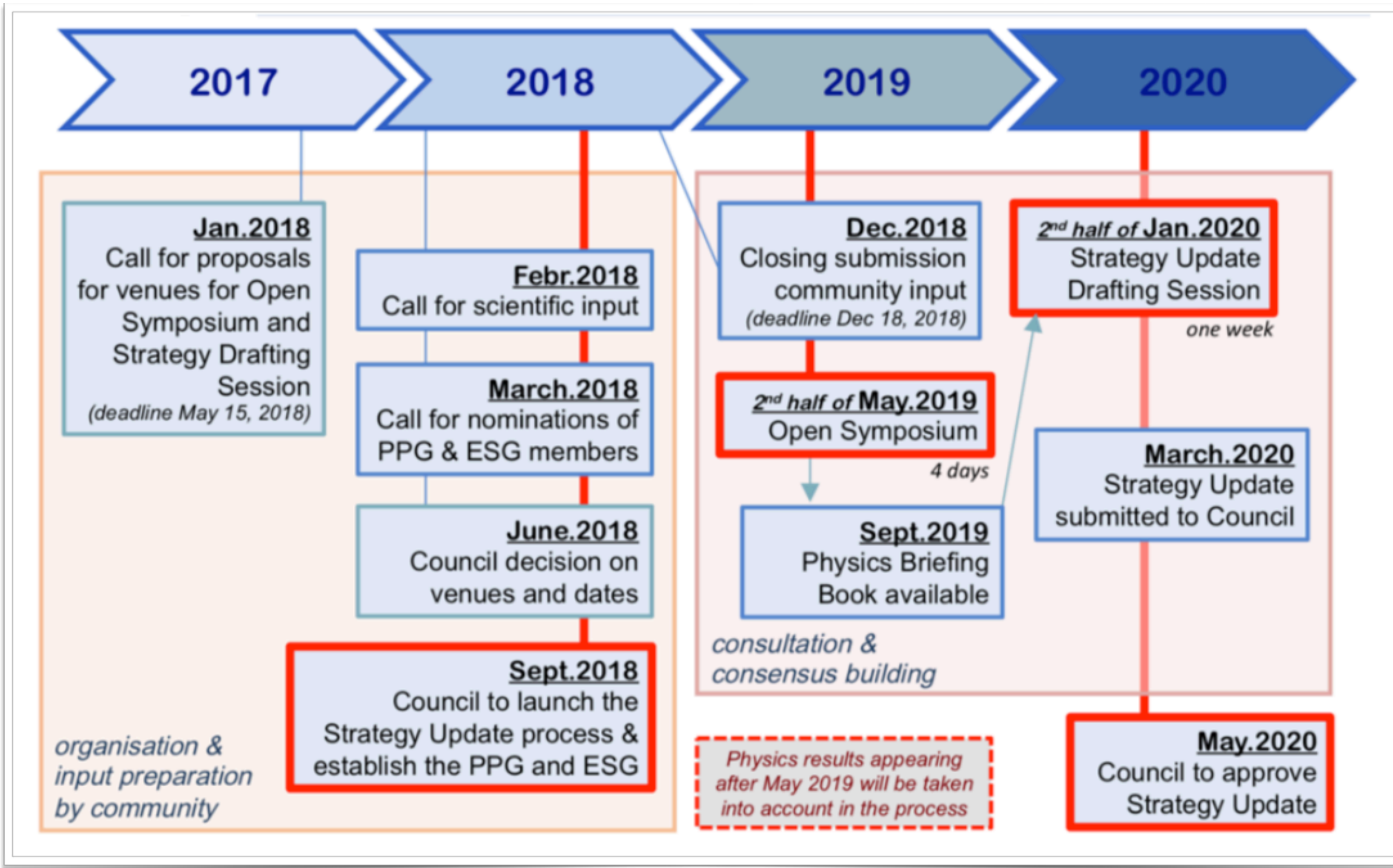


ITS ALL ABOUT OUR FASCINATION

What is behind the door?



EUROPEAN STRATEGY FOR PARTICLE PHYSICS

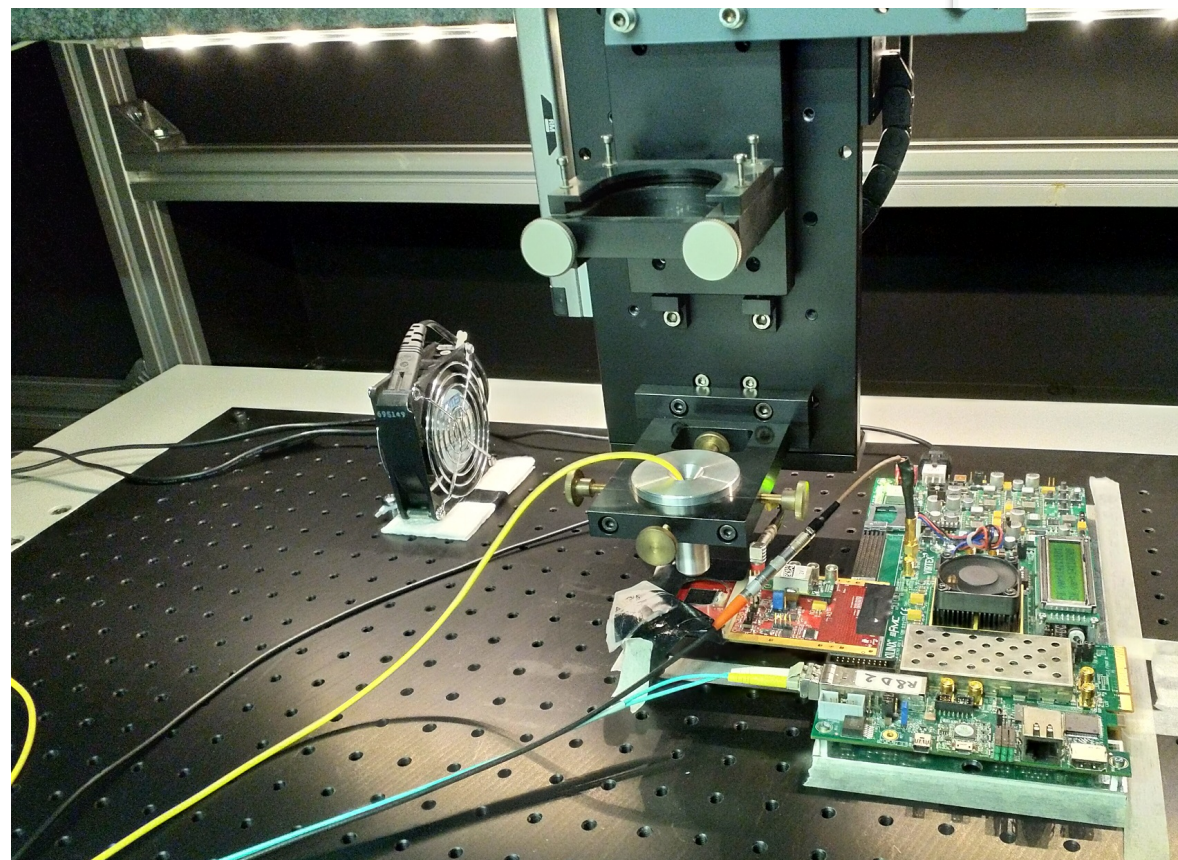
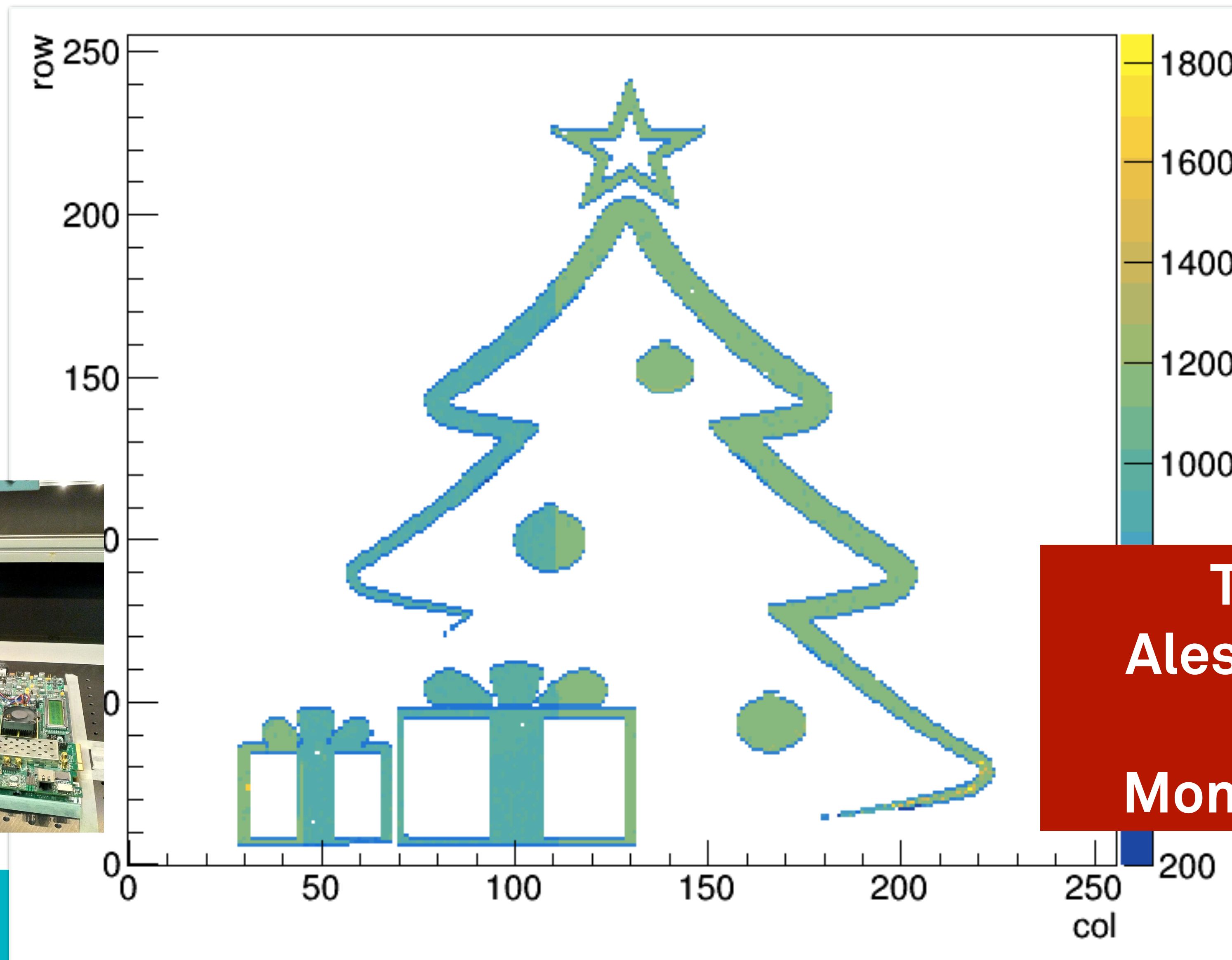


ESPPU-NL

- European Strategy:
 - Eric Laenen
 - Sijbrand de Jong
- Physics Preparatory Group
 - SB

I hope you will be part of the Future of Particle Physics

MERRY X-MASS AND A HAPPY 2019!



**Thank you,
Alessandro Grelli
&
Monique Lamers!**

Martin Fransen