

# German outreach network

## Netzwerk Teilchenwelt

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# Netzwerk Teilchenwelt



- ▶ **Network** of 30 universities/research labs (Standorte) + CERN
  - Bundle existing activities
  - Share structure and programs
  - High visibility and impact
  - 105 groups signed LOI
- ▶ **Brand established since 2010**, high school students and teachers education
- ▶ **Broad range of topics**: particle physics, astroparticle physics, nuclear and hadron physics, incl. applications
- ▶ **Target groups**: high school students, university students, teachers, broader public
- ▶ Win for school, BSc, MSc, PhD students, group leaders

**Still growing: + 1 Research Lab  
(FZ Jülich since Monday)**



Project team:  
TU Dresden, CERN, DESY

Hubs:  
Bonn, Mainz, Münster



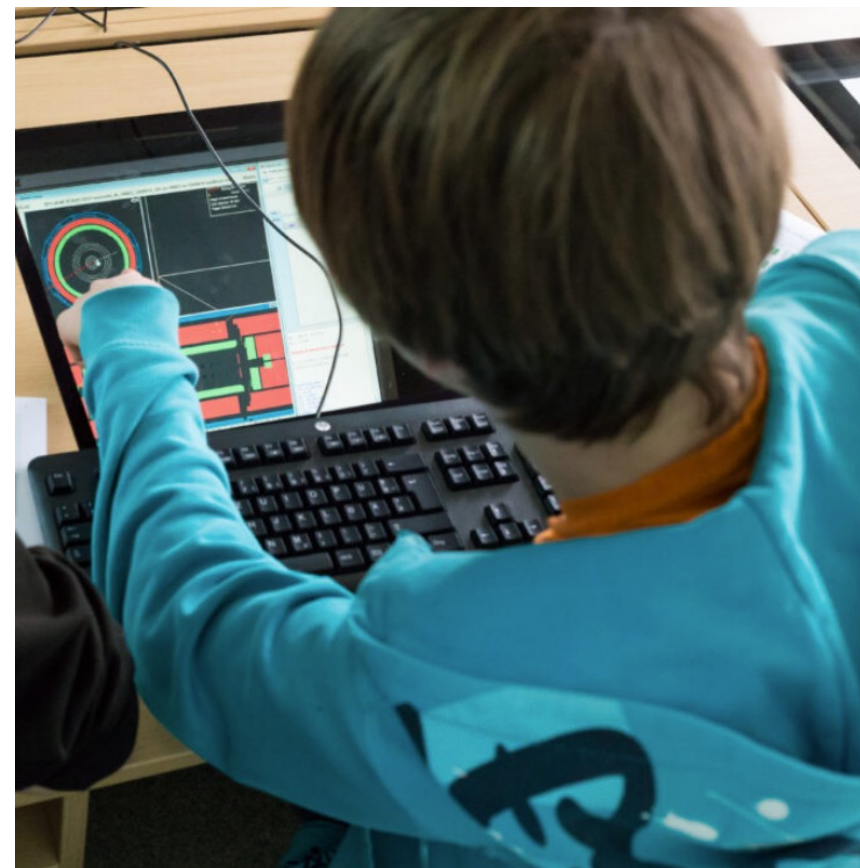
# Funding

- ▶ As part of German Framework program “Exploration of universe and matter”
  - Ministry of Education and Research (BMBF)
- ▶ 4 Fields of action
  - Large Scale Facilities
  - **Networking**
  - **STEM young scientists**
  - **Transfer & participation**



GEFÖRDERT VOM

Bundesministerium  
für Bildung  
und Forschung



KONTAKT: Coordination, young talents ...



DR. HANS RIEGEL-STIFTUNG



Nation-wide teachers program “Forschung trifft Schule”

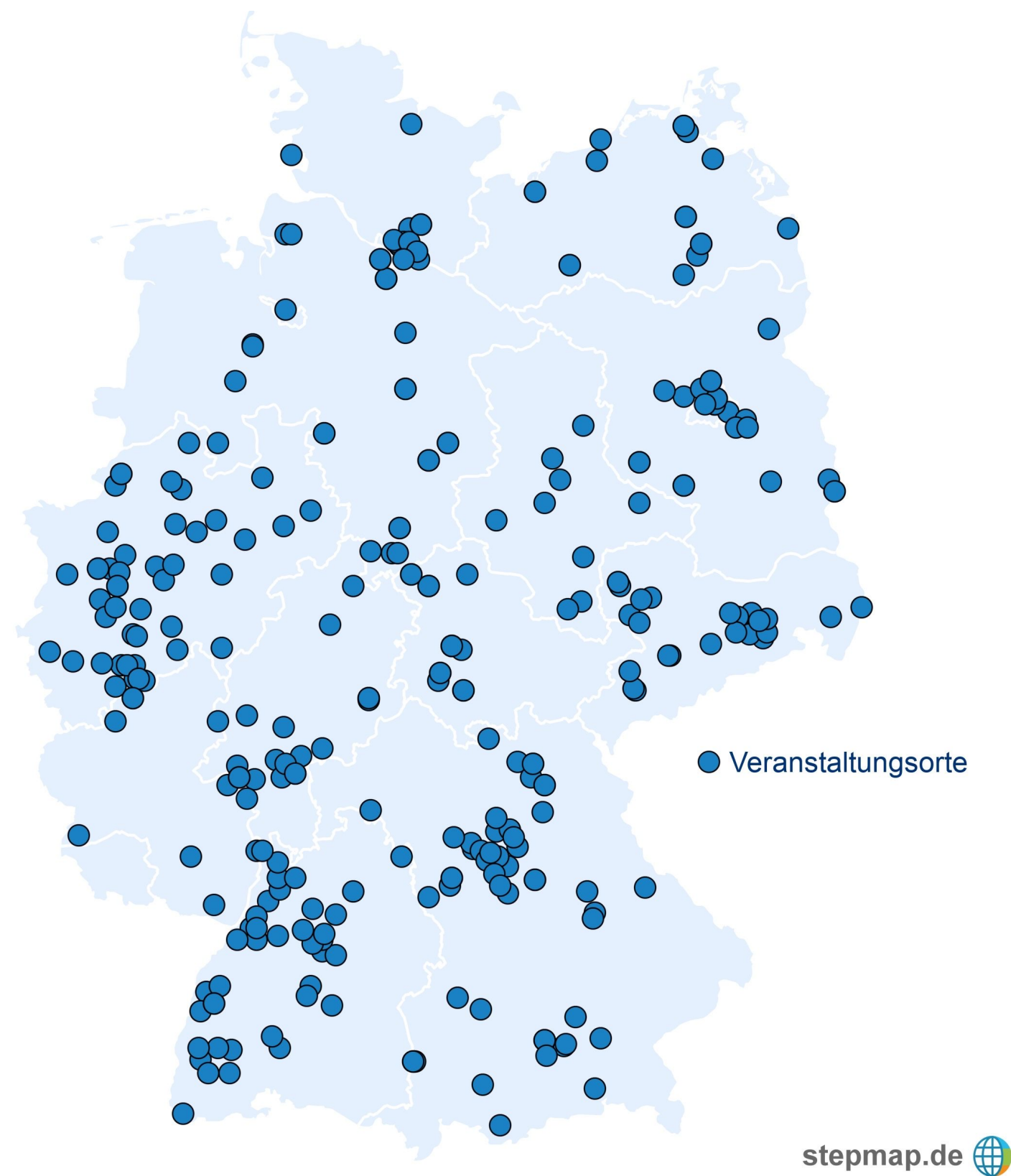


4 Volume teaching material  
(50 000 copies distributed) ([link](#))

Continuous funding allowed the network to grow and strengthen the connections (internally and to society). Facilitates the mission of **attracting young people** and **outreach to the general public**.



# Masterclasses with High School Students



2010 – 2014



2019

- Since COVID: Masterclass@home
- additional online program
  - Lower threshold for participation





# Multi-Step Program – Fostering Young Talents

1 day in school  
incl. presentation  
and analysis



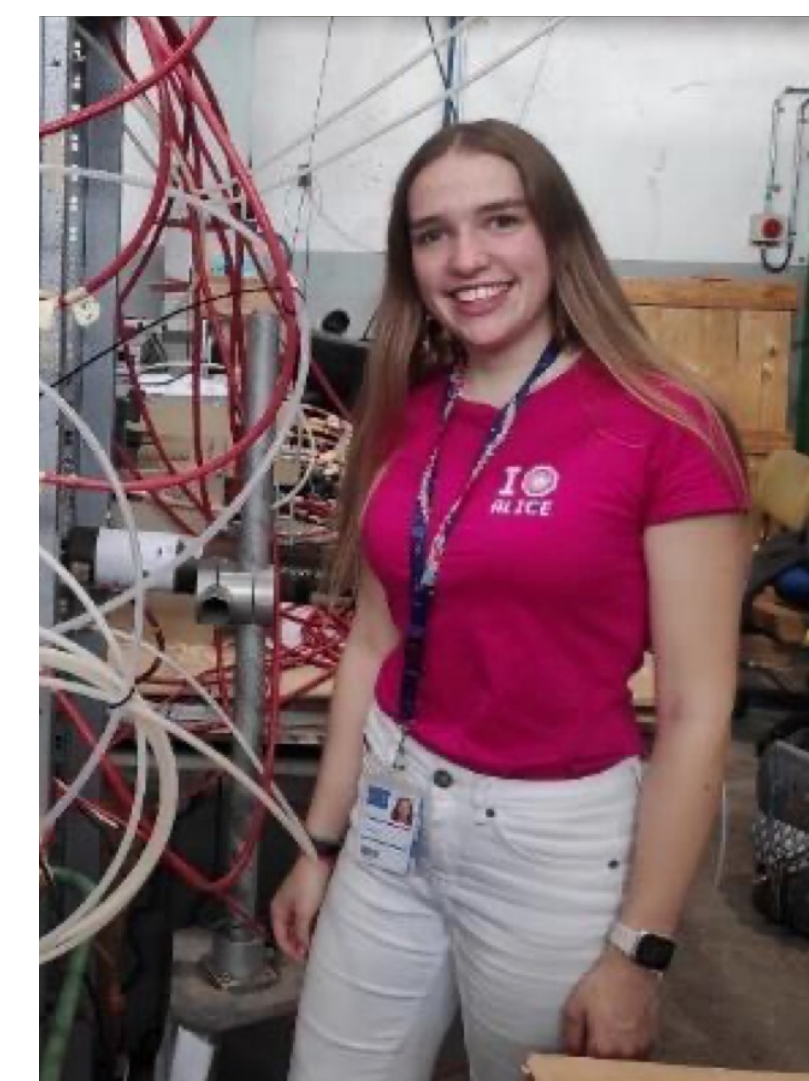
Masterclasses



Active engagement,  
detector project

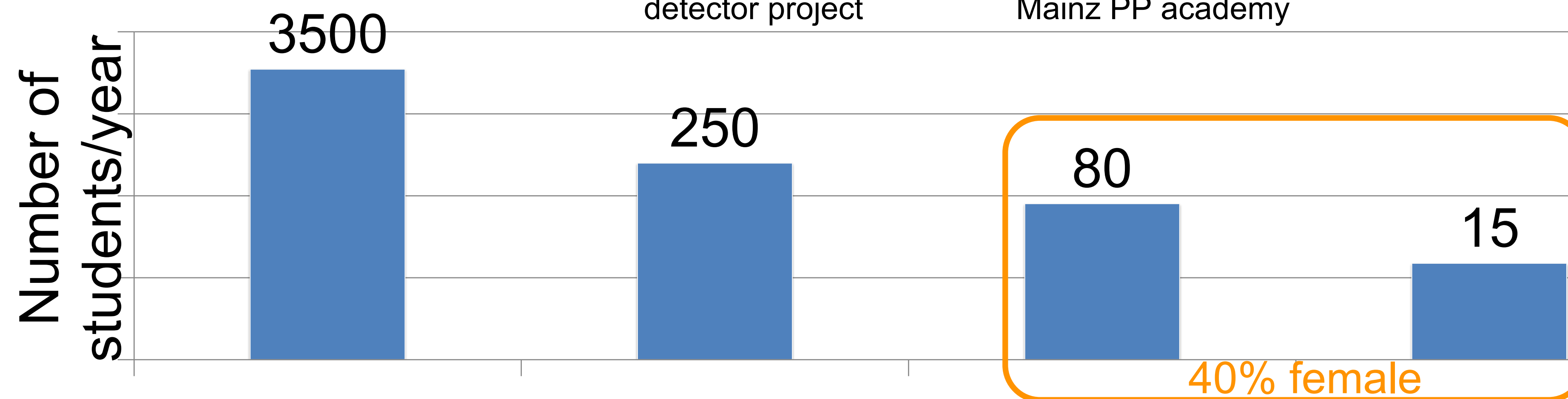


4-day CERN workshops  
Mainz PP academy



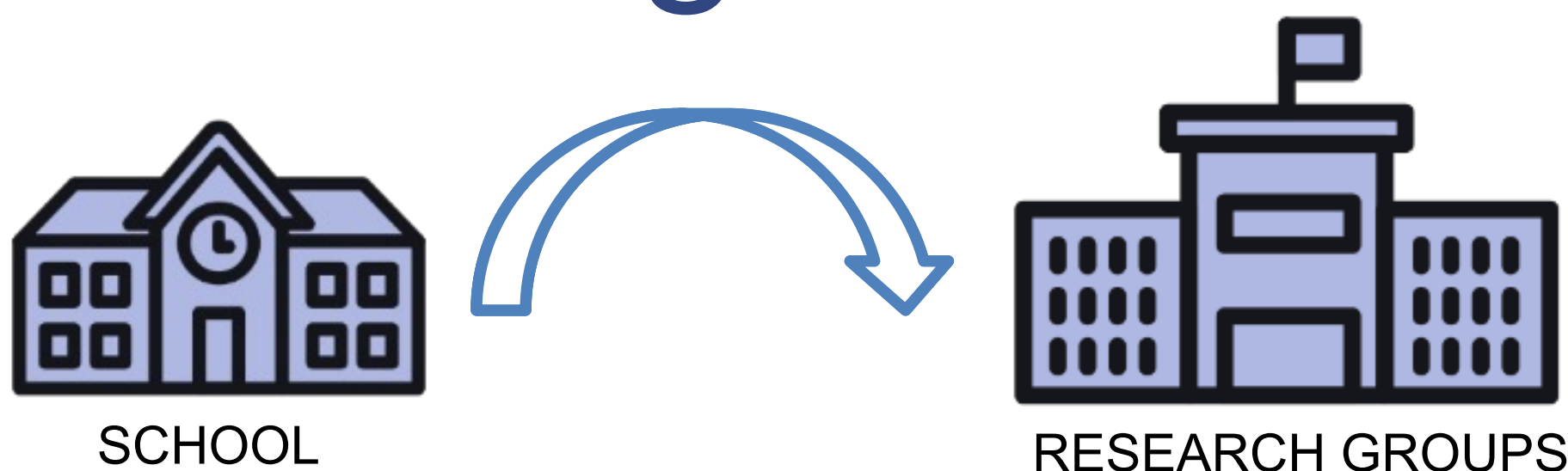
own research projects

140 research essays  
39 award winning  
([link](#))





# Fellow Program

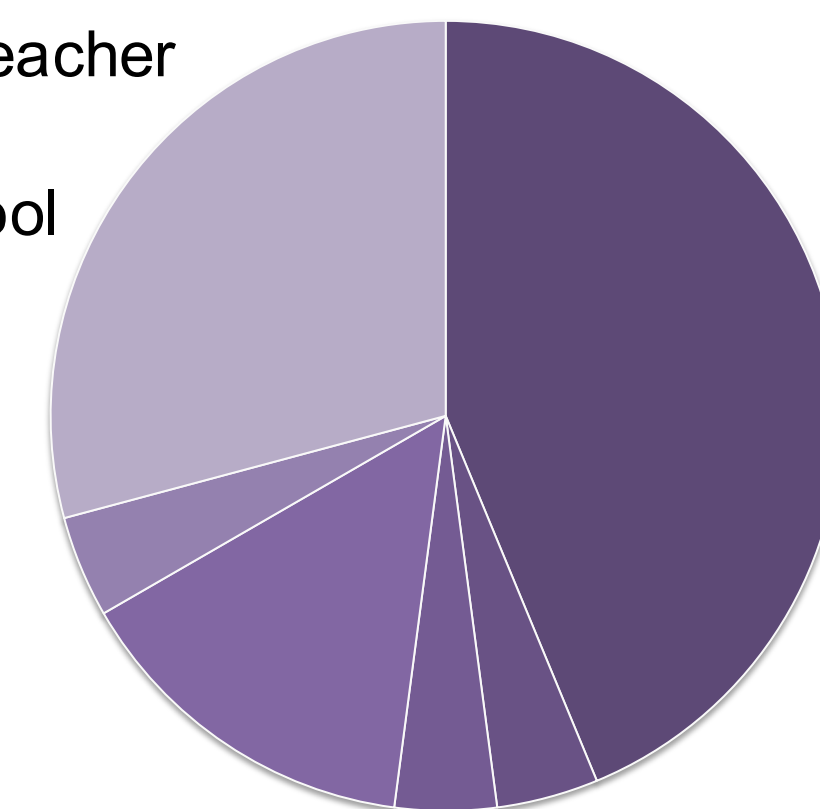


- ▶ 120 people, **50% female (program launched in 2017)**
- ▶ Mainly alumni of CERN workshops
  - Now often studying physics or shortly before that
  - Local offers: Internships, excursions, invitation to outreach events, colloquia, regulars' table etc.
  - Opening to engaged young physics students
- ▶ Central offers: fellow physics school, national physics conference attendance, "Ask the expert", etc.



■ Physics  
■ PhD  
■ Medicine

■ Physics teacher  
■ STEM  
■ High school



**Win for fellows: Close and early connection to research, extra training, networking**

**Win for Groups: Close connection to highly motivated, well trained students, possible support in science and outreach**



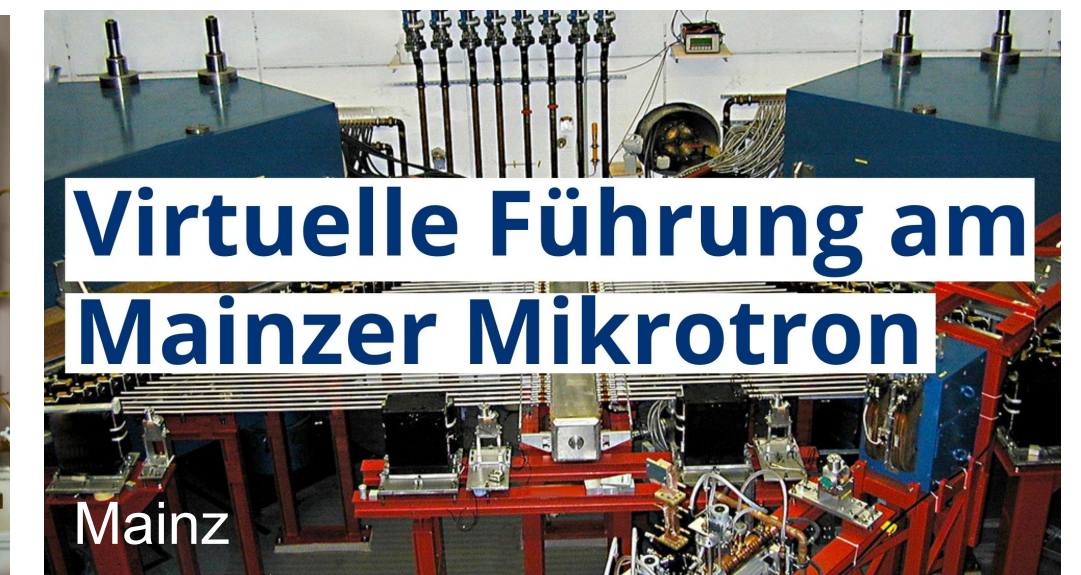
# Topical Week

- ▶ 02.11. – 06.11.2020
- ▶ Common framework during the pandemics
- ▶ [wochederteilchenwelt.de/](https://wochederteilchenwelt.de/) with agenda, common (social) media approach and advertisement
- ▶ 20 Events for general public
  - **Virtual visits at LHC experiments and various labs (Bochum, Mainz, ...)**
  - Talks and discussions
  - **Masterclass@home**
  - Science Café, Science Show, Science Slam

**Virtual formats:**

**Low level access and nation-wide advertisement a big advantage**

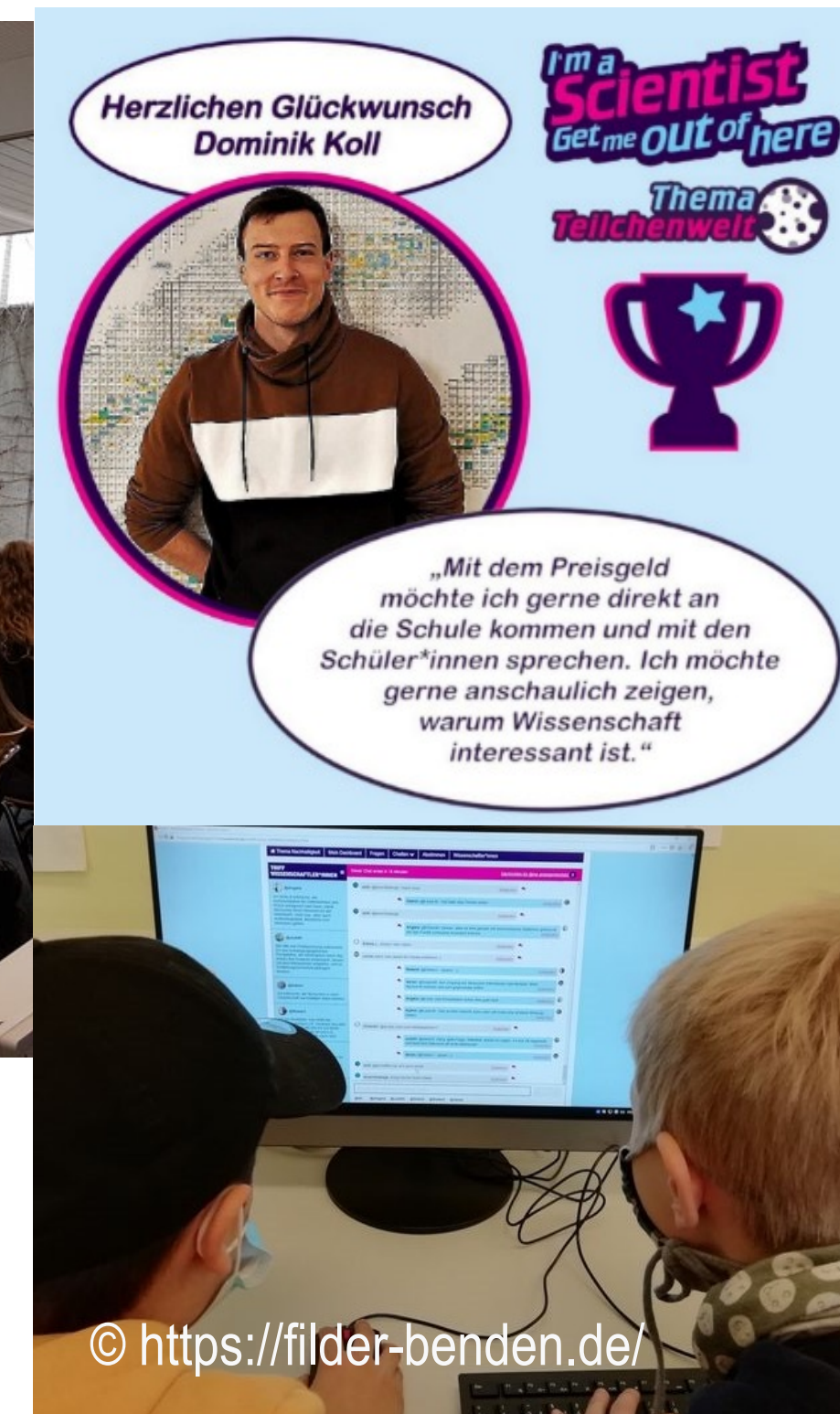
**Common Developments boosted by Corona**





# I'm a Scientist – get me out of here!

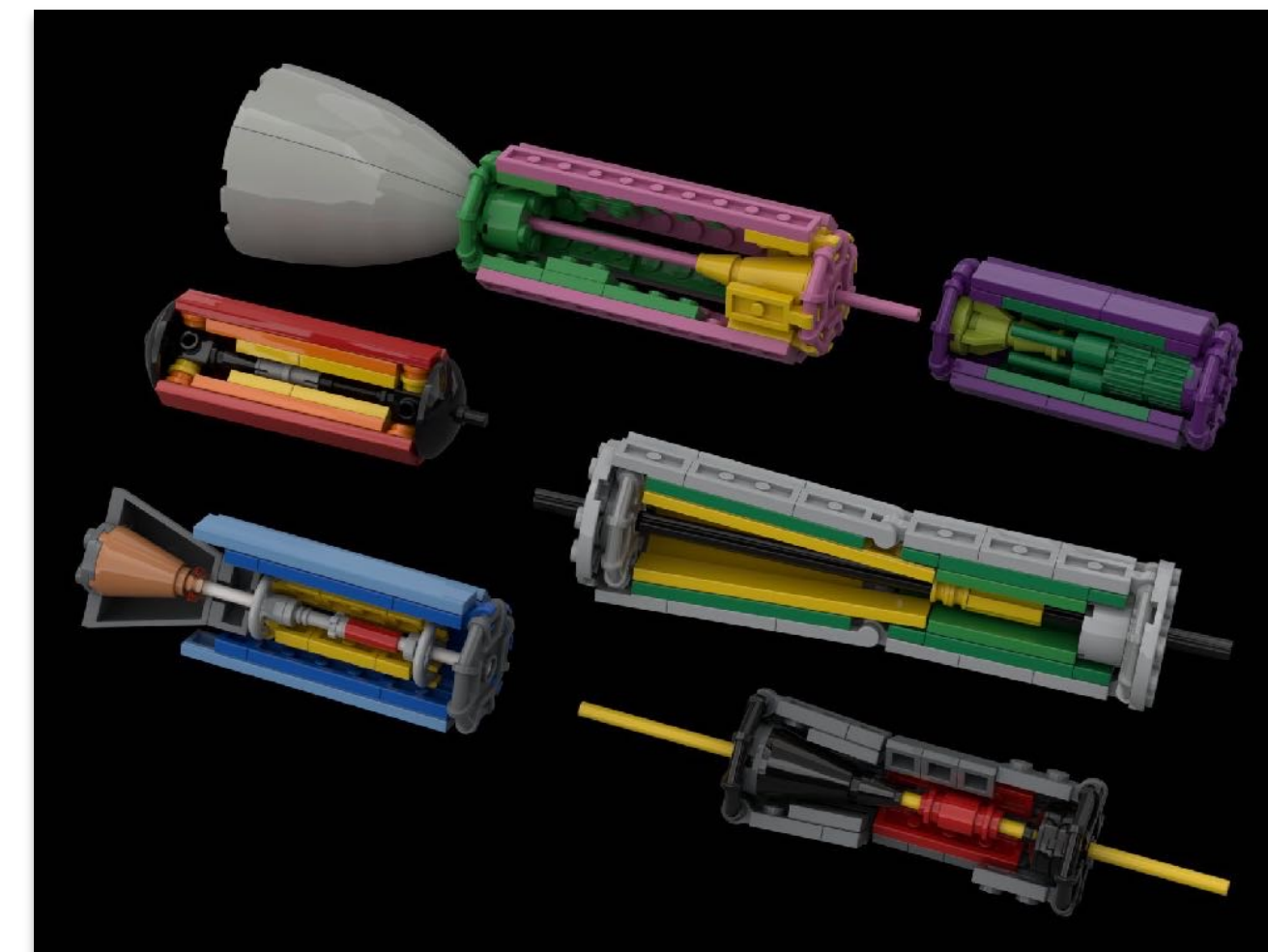
- ▶ online, student-led STEM enrichment activity
- ▶ connects school students with scientists through real-time text based chats
  - Teachers book a 30-min timeslot for their class
  - Each slot = text-only non-public live chat
- ▶ Students can:
  - **Chat** with real scientists, in real time
  - **Ask** any questions they like
  - **Vote** for their favourite scientists
- ▶ Additional public chat
- ▶ 8.-19. November 2021: Particle and Astroparticle Physics (“Teilchenwelt = World of Particles”)



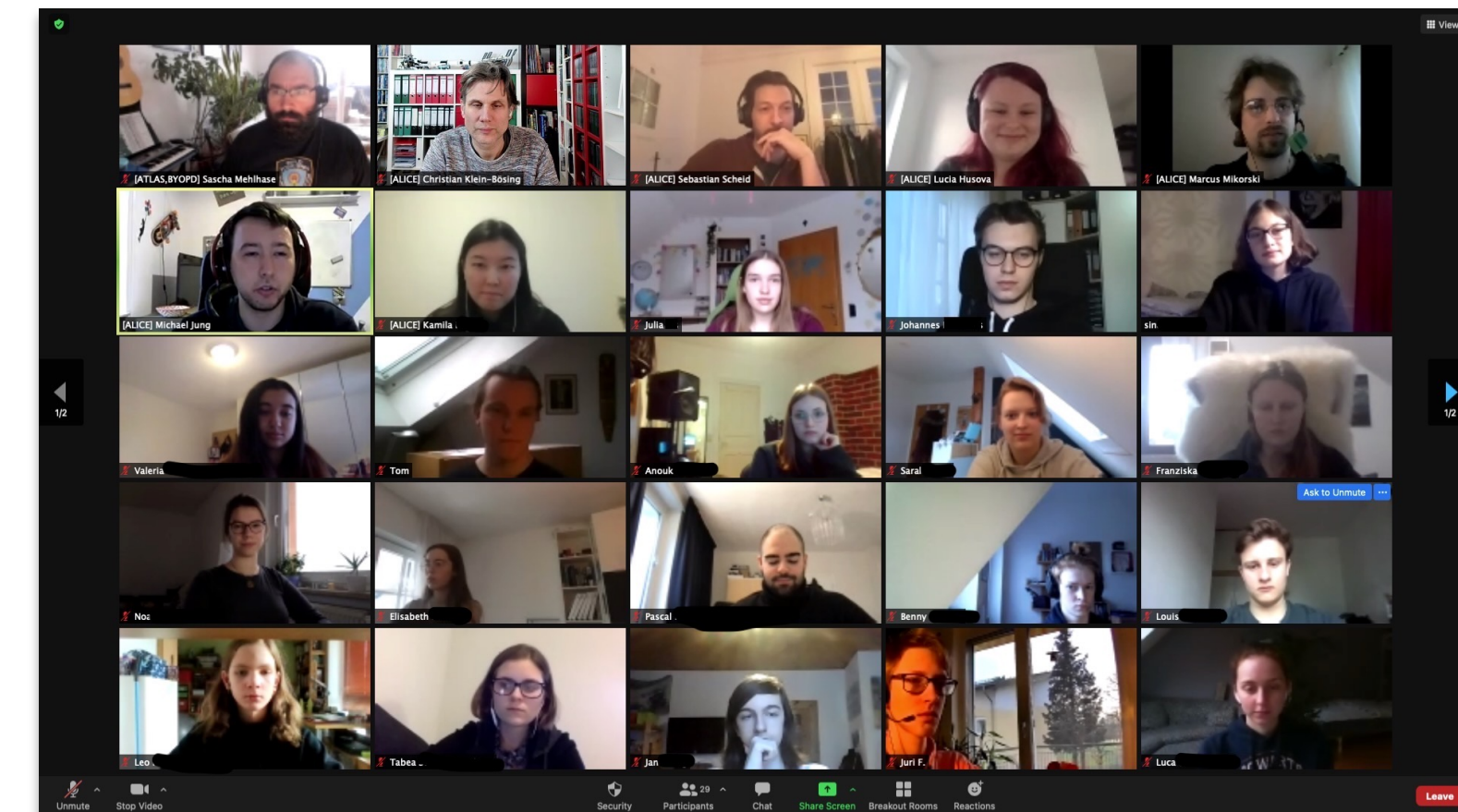


# LEGO® Project

- ▶ Goal: ALICE model in LEGO® figure scale
- ▶ ALICE Germany + Netzwerk Teilchenwelt + Sascha Mehlhase (BYOPD)
- ▶ January – June 2021
  - 7 tutors
  - **Weekly ZOOM meetings**
    - 2 – 4 h
    - 16 participants over the full period
    - 100h/p.P. in workshop alone
- ▶ June 2021: Building one Weekend
  - Major news coverage (paper, online, TV)
  - Many follow-up requests (public talks, primary schools)
- ▶ Participants engaged further in particle physics



Competing designs: Inner Tracking System (ITS)



ZOOM Kick-Off: 22 + 7 participants

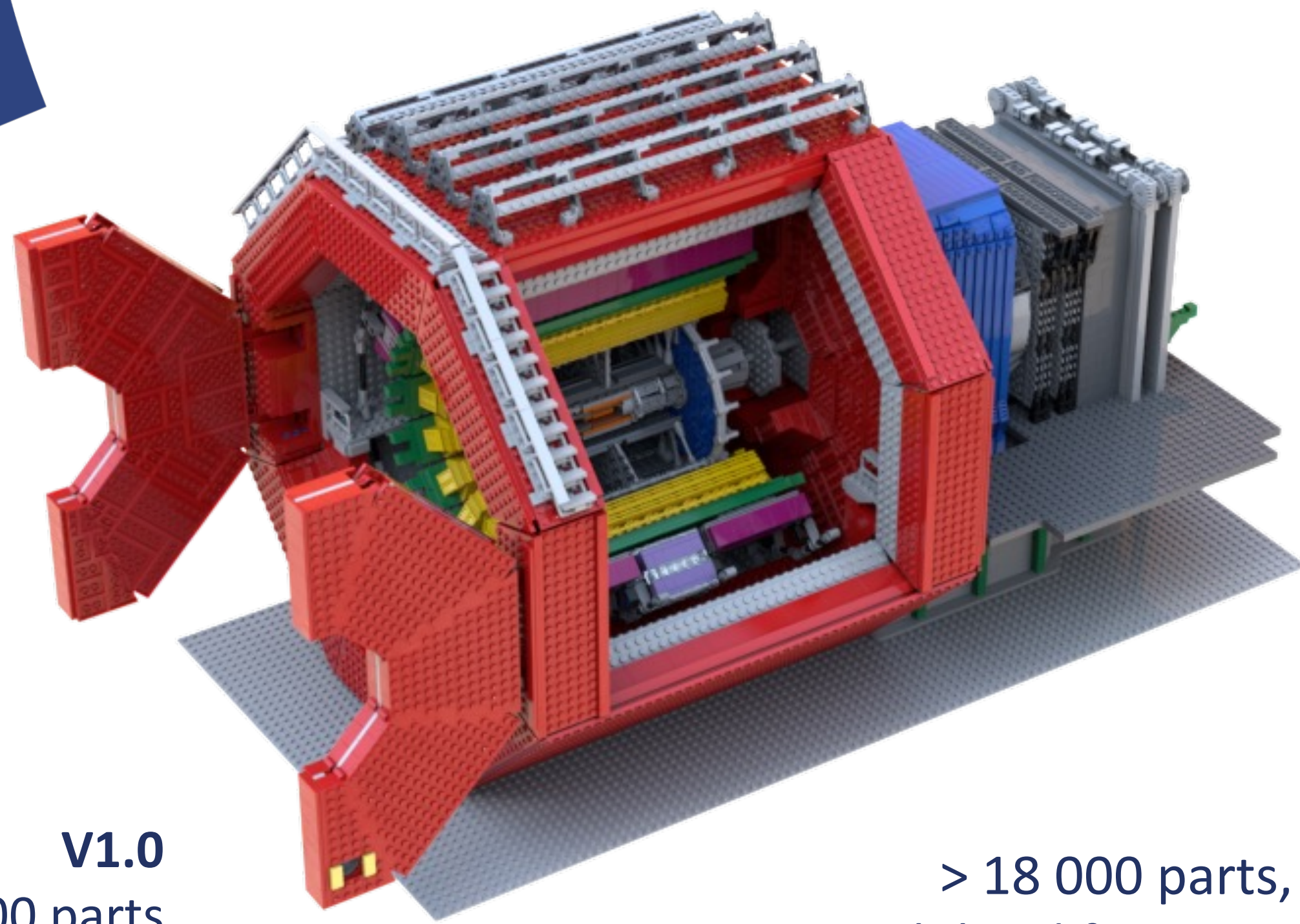


TV report on building ALICE (WDR Aktuelle Stunde)



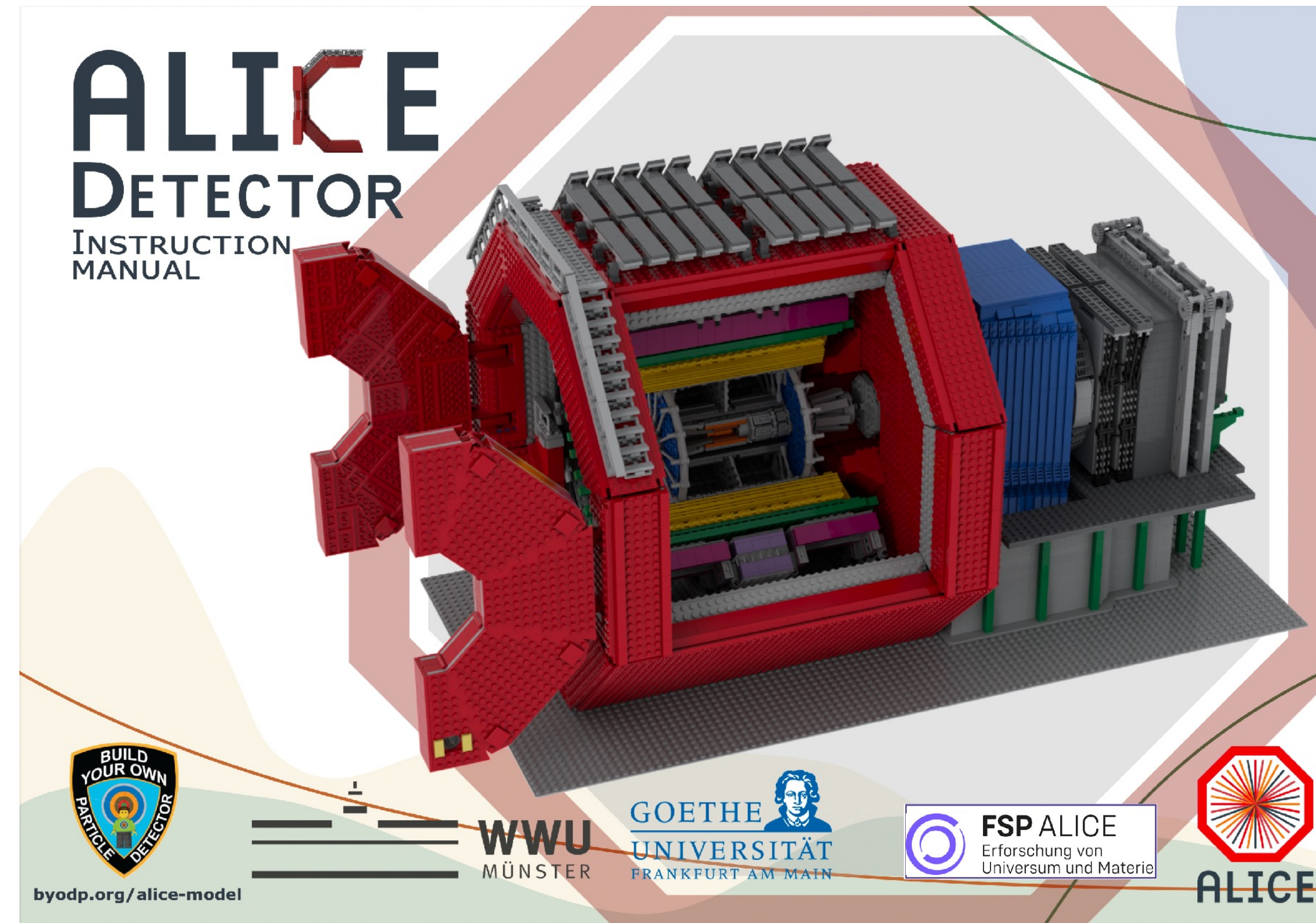
# ALICE LEGO® Upgrade and Release

Part of the team continued for **12 months** to design a significant upgrade and professional instructions!



**V1.0**  
> 16 000 parts  
16 kg

**V2.0**  
> 18 000 parts, 18 kg  
Stabilised from prototype  
Design refinements  
Full step-wise instruction,  
Sub modelling, detector info



Instruction manuals released for worldwide usage at [BYOPD](https://byodp.org/alice-model)



# Urknall Unterwegs

- ▶ Pop-Up exhibition on tour since 2021
- ▶ Open structure and activities for all ages
  - Archway: Time travel to the stars and the Big Bang
  - Pillars: Particles and interactions, research methods, spin-offs and people
  - Pavillon with games: Particle Twister, Quark Tower, LEGO
- ▶ Inflatable for in and out-doors

Reaching out to people in public spaces



- 2021/22
- steht fest
- in Planung

März: Hamburg | Dresden | Aschaffenburg  
 April: Karlsruhe  
 Mai: Berlin  
 Juni: Aachen | Berlin | Münster | (Hamburg)  
 Juli: Bochum | Dortmund | München  
 August: Bonn | Heidelberg | Hamburg | Frankfurt

2023: with stops of science boat  
 MS Wissenschaft



© Philipp Lindenau





# In action



[Quark tower @ DPG 2021](#)

[Particle twister](#)



# Central Coordination: Key to Connect the Network







# Common activities

- ▶ Standort-Treffen (1 person per university/research lab), 2 x p.a.
  - exchange on activities, best-practice, presentation of new developments (Masterclasses, detectors) ... next meeting at noon today
- ▶ Virtual Lunch meeting (60 min), 6 x p.a.
  - Regular low-threshold exchange
- ▶ Working groups on various topics
  - On specific target group, nuclear and hadron physics, communication (website, newsletter) etc.
- ▶ Outreach and communication training for young scientists (PhD, MSc)
  - English and German version
- ▶ Onboarding events (2h) for young scientists, 4 x p.a.
- ▶ Outreach talks and parallel sessions at physics conferences and meetings
  - DPG-Tagung (German Physical Society), FSP-meetings (German collaboration groups)



# Support Structures and Material

- ▶ Website/Portal <https://www.teilchenwelt.de>
- ▶ Newsletters for high school students and for teachers, social media, event calendar
- ▶ Corporate material
  - Flyer, poster, shirts
- ▶ **Material for workshops and teachers**
  - 4 volume teaching material (50 000 copies distributed, [link](#))
    - „Charges, Interactions and Elementary Particles“
    - „Cosmics Rays“, „Research Methods“ and „Micro Courses“
  - Training program „Forschung trifft Schule“
  - Digital games and work sheets
- ▶ People data base (monitoring, track records)
- ▶ Internal wiki documentation
- ▶ Financial support for workshop tutors





# Summary

- ▶ Netzwerk Teilchenwelt promotes outreach activities and exchange in the community for 13+ y
  - Bundles **existing activities**
  - **Shared** structures and programs
  - > 200 events/year, 3.500 high school students in Masterclasses  
→ **young talents for science**
  - Maintains 50% women throughout all stages of the qualification program
  - **Visibility and impact** through joint activities
- ▶ Existing programs and structures create **multiple benefits**
  - win for **high school students**: experience modern research first-hand
  - win for **(PhD) students**: train their communication skills, participate in rewarding exchange with the public
  - win for **physicists**: get young talents for the research groups

## RECFA evaluation 2022 for Germany

*...impressive and well-structured outreach and education programmes. Under these programmes, a **diverse set of high-impact outreach activities** is carried out, using a variety of tools and resources. In particular, we would like to mention the **very successful activities reaching out to secondary-school students (masterclasses)**.*

PROJEKTLEITUNG



PARTNER



SCHIRMHERRSCHAFT



FÖRDERER



GEFÖRDERT VOM

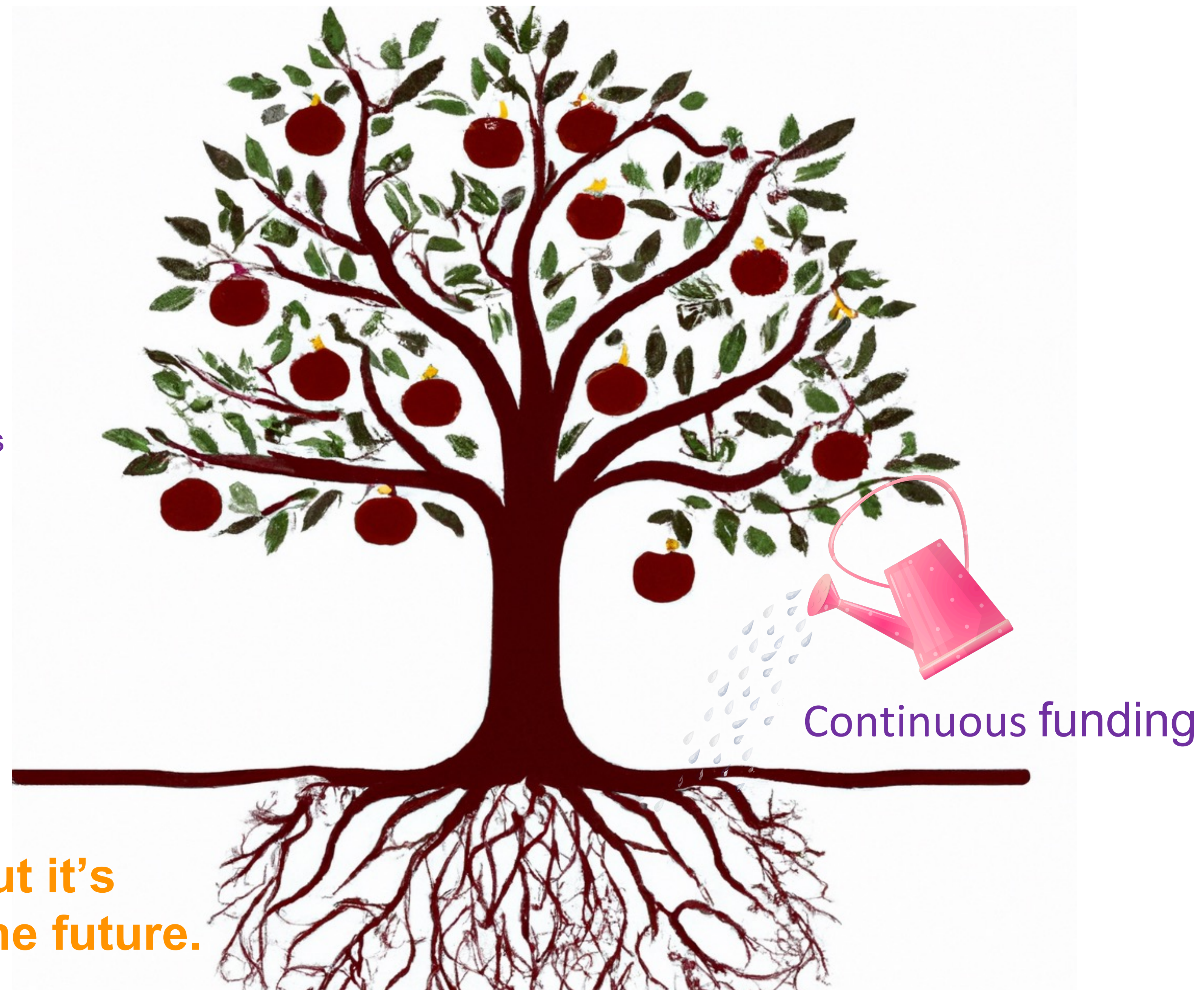




# Growing a Network or a Tree...

Soil:	Particle, nuclear and astro physics
Stem:	Central coordination
Branches:	Hubs and sites
Leaves:	Scientists
Fruits:	Events for the public

**It takes time to grow a tree, but it's  
a sustainable investment in the future.**







The thickest tree in Sofia...  
took about 600 years to grow [link](#)