Netzwerk Teilchenwelt

Coordinated Outreach and New Talents

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Young Talents

ages < 18

Participatory Science Communication

School & University

Teaching

University & Research centers

Research

We need to keep feeding the pipeline, to do research in the future

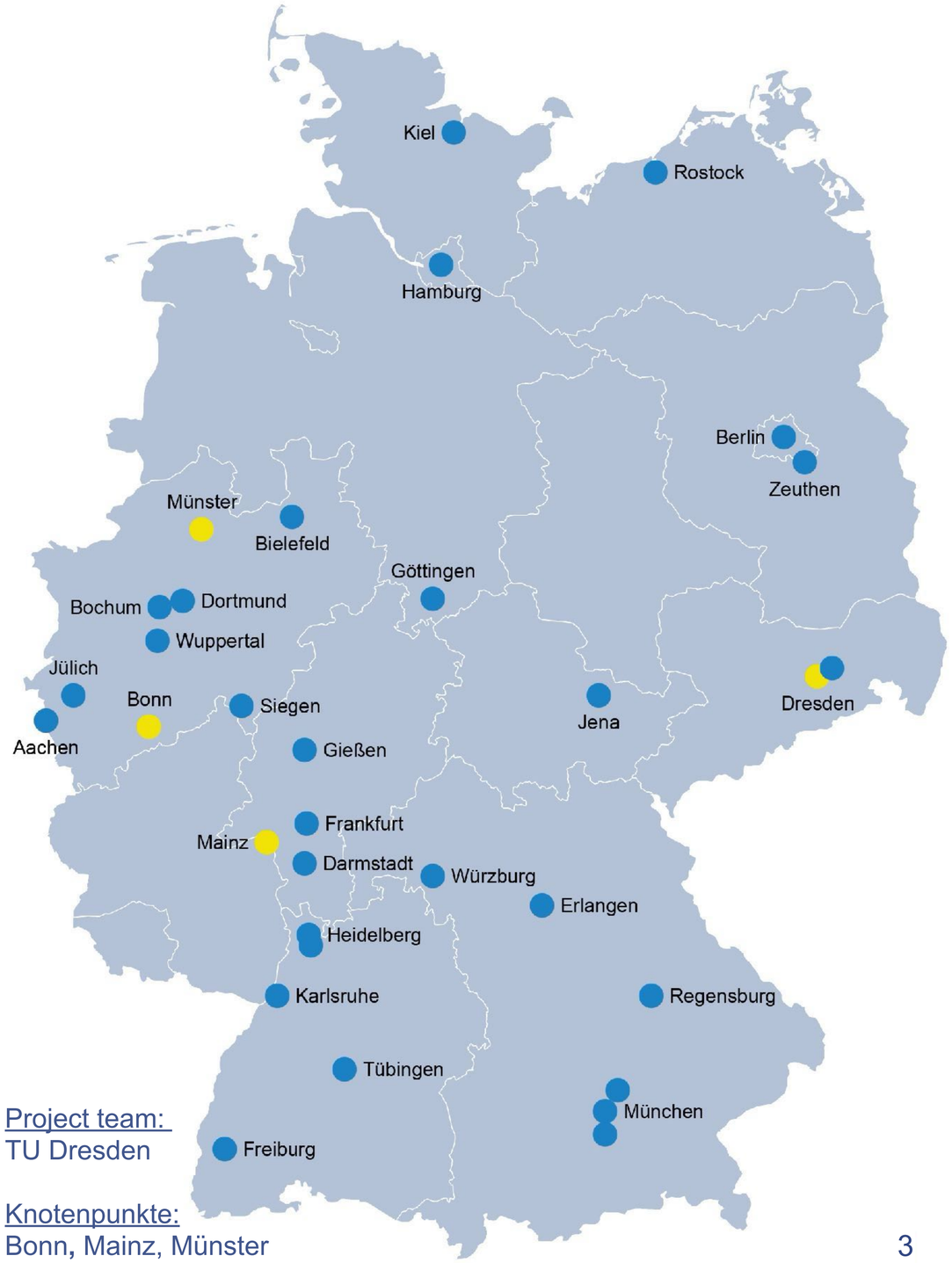
General societal task for physics/STEM/highly skilled workforce

Physics BSc Theses (DPG statistics):
2020: 2487 2021: 2427 2022: 2439, 2023: 2279, 2024: 2229
(ca. 25% female)

Backup slides: General public, more data

NETZWERK TEILCHENWELT

- **Network** of 34 universities/research labs (Standorte) + CERN
  - **134 group leaders** signed LOI
  - **Bundle** existing activities
  - **Share** structure and programs (e.g. monthly “lunch meetings”, Standortreffen …)
  - High **visibility** and **impact,** with core expertise for high school students and teachers education
- Well connected to astroparticle physics (DESY-Zeuthen), DESY, LHC-Office, ErUM FSPs, FAIR, Exc-Clusters, Largely funded via BMFTR (ErUM): KONTAKT, KONTAKT2, KIeT^3 consortia
- Strong growth and broadening in FP21 – 24 via **diverse topics and target groups** at hubs
- **Explicit inclusion of nuclear and hadron physics** (NTW Best practice e.g. in NuPECC LRP 2024)



(International) Brand for nuclear and particle physics communication in Germany since 2010.

Project team:
TU Dresden

Knotenpunkte:
Bonn, Mainz, Münster

Facilitators / Vermittler*innen

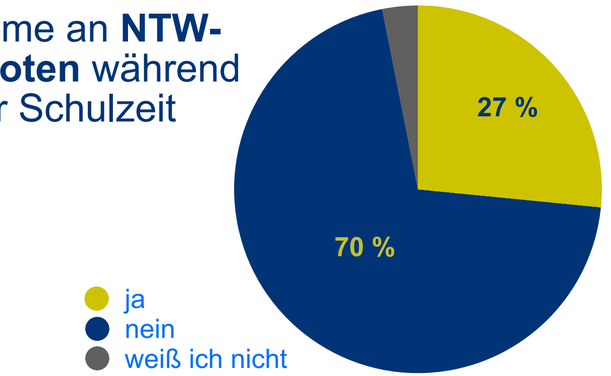
- **150 PhD and Master students** engaged in Netzwerk Teilchenwelt.
- Guide **core program Masterclasses** and supervise students´ research projects: **1613 MCs since 2010**
- **Authentic role models** close to young talents
- NTW offers
  - Science communication and outreach training (2.5 days)
  - Frequent (online) onboarding events for new PhD students and introduction to specific Masterclass
- Builds additional networks outside own collaboration (broaden for future career)
- Provides self efficacy as a scientist and a **personal impact to society**
- Create and improve content
- Role models influence career-related choices (**long term impact)**
  - **38% of facilitators attended a Masterclass** as a high school student (evaluation from 2024)

Sustainable impact via long term program.
Masterclasses are “first contact”.


Particle Therapy Masterclass

yHep-Survey

Teilnahme an **NTW-Angeboten** während eigener Schulzeit



From Broad Impact to Peak Talent

Julia with ALICE ITS3
JuFo Winner 2022
(wochenspiegellive)

CERN project weeks (120 since 2010)*
Own research project
(BeLL, 5. Prüfungskomponente, Jugend forscht,…)
List of 170 essays, incl. 52 awards

CERN-Workshop (4 days, 700 talents since 2010)*
Teilchenphysik-Akademie Mainz (1 Woche)

Own engagement
Detector project, tutoring
work with Cosmic@Web

Masterclasses in schools, labs or online
- Particle physics
- Astroparticle physics
- Nuclear and Hadronphysics
- Machine Learning, Numerical Simulations

*suspended due to funding cuts in 24 - 27

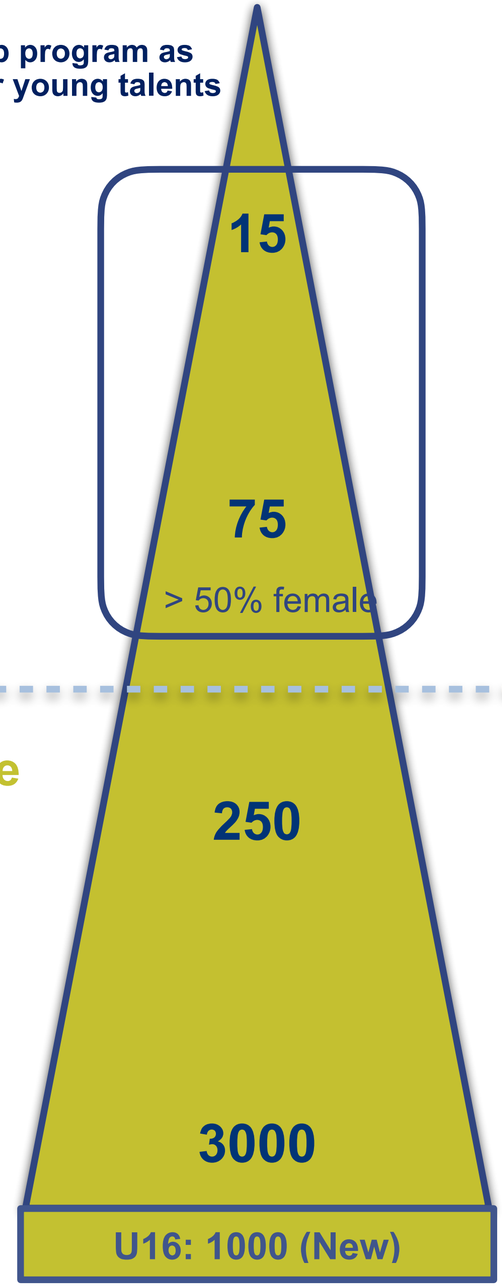
Fostering the next generation of scientists, engineers, skilled workers … via long term attachment and perspective

Physik BSc:
2022: 2439, 2023: 2279, 2024: 2229
(ca. 25% female)

ICHEP Proceedings Masterclasses

ICHEP Proceedings U16

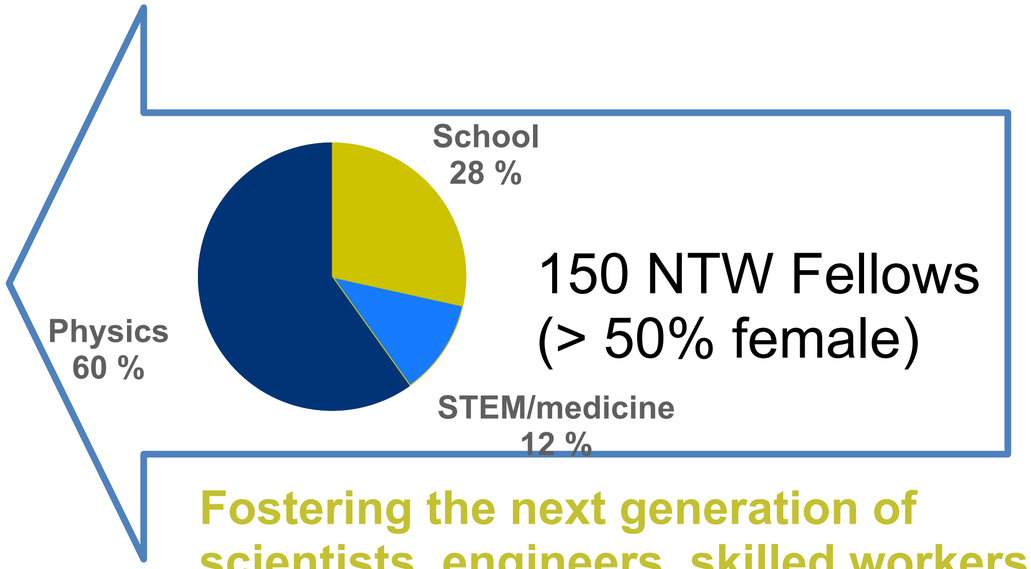
Multi-step program as pipeline for young talents



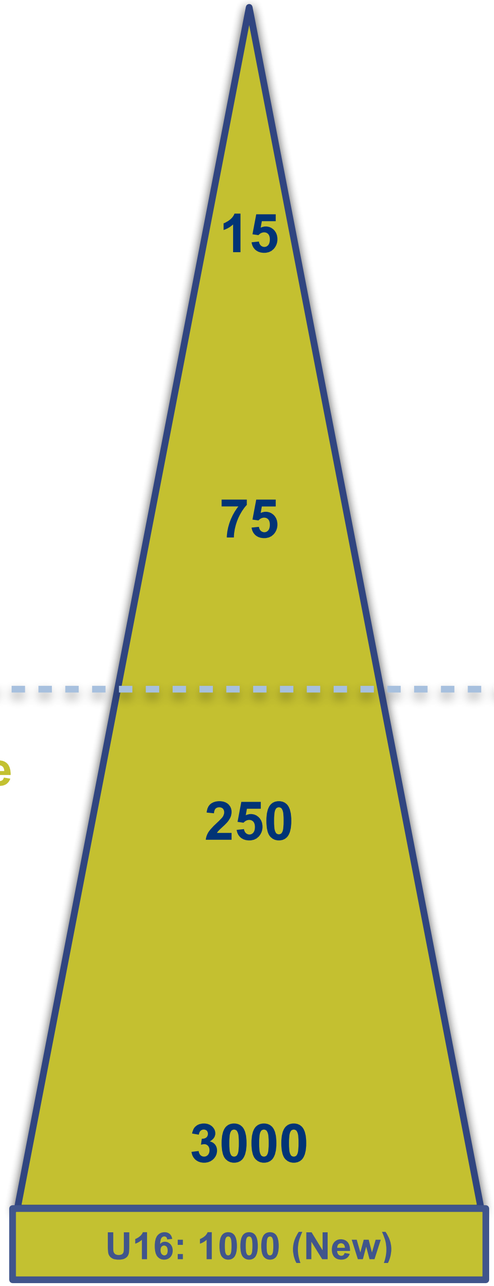
CKB

From Broad Reach to Peak Talent

RESEARCH GROUPS



**Fostering the next generation of scientists, engineers, skilled workers …
via long term attachment and perspective**



Last Fellow Meeting (Münster 2023)*

*suspended due to funding cuts in 24 - 27

Fellows supporting CERN70 / Berlin …

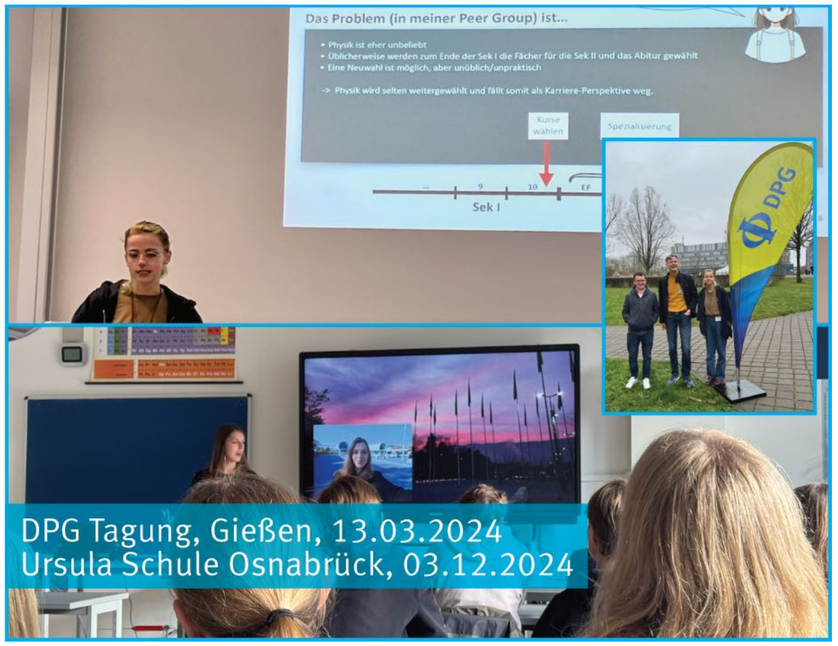
CKB

Active Participation on all Levels

- Attach talents via **long term involvement** and personal contributions in research and science communication
- Starting at entry level for fellows (16 yo)
- Peer teachers and content creators (workshops, talks)
- Social Media: Lucky punch with pendulum video (6.5M views, 100 k likes, TikTok)
  … but not a **measure for sustainable impact!**

Joci (16) presenting at DPG (abstract)

Carla (19) presenting at a school



Substitute CERN Workshop October 2025
(75% female, review)

WILHELM UND ELSE HERAEUS-STIFTUNG

Content by the participants. reaching into their peer group (in sum > 40 k views)

TEILCHENWELT.MS

Leveraging passion for science and communication

Leveraging Impact …

Multiplication via teachers


Physikzentrum Bad Honnef 2025


CERN Summer School 2025

Forschung trifft Schule (2017 – 2025, 958 teachers)
funded by Dr. Hans Riegel Foundation

plus NTW teacher material and contributions
to major school books
Dorn/Bader Physik SII (2023 Bayern)
Metzler Physik SII (2026 Gesamtband)

Deutsches Museum Bonn

Mobile exhibition for conferences/events
(Urknall Unterwegs)

Quantum 2025

Major part of Quantum Year
Quanten to Go: 40 events in NRW
(workshops, exhibitions, talks
and DPG closing event)

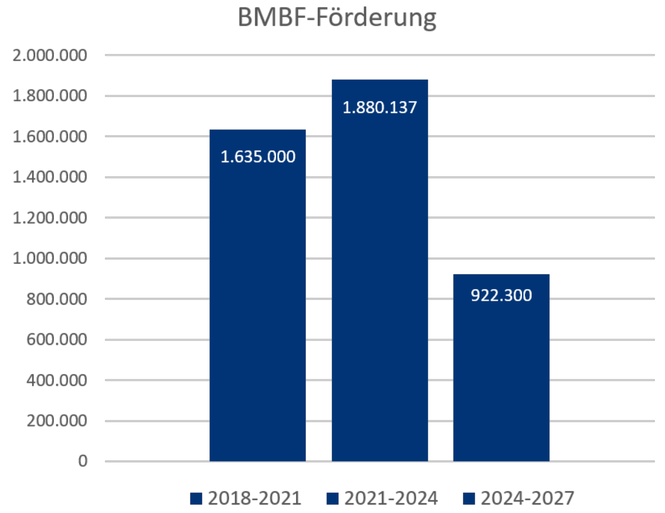
NTW seed for funding and various partnerships

Current Challenges

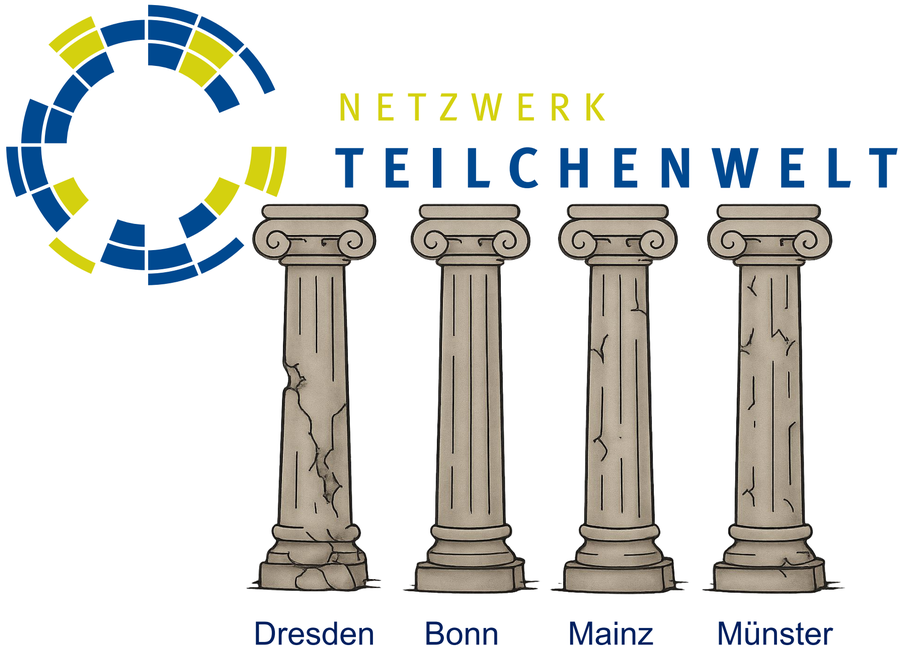
Consortium in FP 2024–2027 (Klet³)

- Significant cuts (–51%), especially Dresden (–76%)
  - Structural positions, staff at CERN (–2 FTE E11, –0.65 FTE E13)
  - Funding for the fellowship programme
  - Reimbursements for facilitators
  - Travel funds for CERN workshops removed
- Network travel funds < €1000 / year
  - **Limited presence in the community**
    (DPG meetings, CERN70 organisation, …)
- Reduction of broad activity (fewer MCs at the sites)
- **Loss of trust and attractiveness for young people**
  (missing perspective for staged programme)
- **Reduced activity** and **redistribution** of tasks to hubs
- Increased **in-kind contributions** have kept operations running
  (personal commitment, substitute proposals, …)

**Established consortium enabled flexible reaction,
long term / staged program not sustainable.**



*Knotenpunkte seit 2019

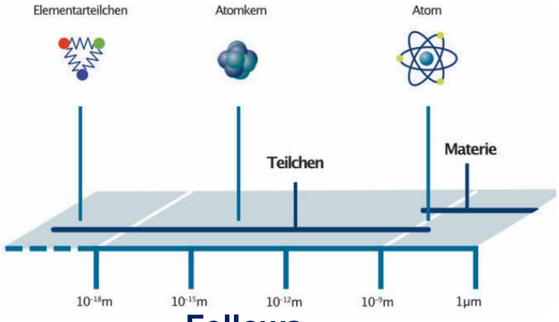


The Near Future

FP 2027 - 2030

- **Essential:**
  - **Maintenance & Operations**
  - Facilitators, fellows, CERN programmes (1 CERN-Person)
  - Keep the long term attachment and intact!
- Proven, robust structure with 4 partners. **versatile and diverse system** (… just like your detector)
- **Renewed proposal as a consortium: Coordination in Münster**
- Sharing work in organisation and community focus areas
  - Dresden: Database, fees, site coordination, CERN project weeks and fellow programme
  - Münster: CERN workshops and U16 activities
  - Bonn: facilitator training and MC
  - Mainz: Particle Physics Academy

Repair the structure of the NTW backbone



Fellows

CERN Project Weeks
Jugend Forscht

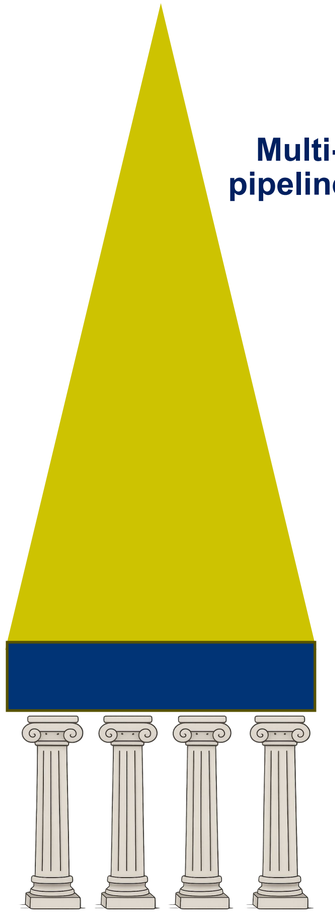
CERN Workshop,
Teilchenphysik-Akademie Mainz

Engagement,
Internships

Entry Masterclasses
Workshops, Interns

Base: Facilitators
34 Standorte + CERN

Supporting Structure:
Verbund: Dresden, Bonn, Mainz, Münster



Multi-step program as pipeline for young talents

plus society at large

Summary

NTW backbone draws young talents and enables broad national science communication

- **Staged program needed** for sustainable effect
- **Reliable** organisation and programs increase attractiveness for partners and youth (from U16 to fellows)
- Coordination + facilitators + fellows and sites **unlock additional funding sources** via NTW
- Core structure **activates in-kind contributions** at 34 sites (ca. 13 FTE in last FP) and
- Contributes to outreach part in many grant proposals (FSPs, Excellence Clusters, SFBs, …)

- Established and trusted brand (**user facility)** for science communication, serving **the full** (astro)particle, hadron and nuclear physics **community** down to the (134) working groups
  - Enables “users” for outreach, fosters exchange
  - Catalyses (and performs) development
  - Main contact for nation-wide outreach distributes information via grown channels (NTW fact sheet)

“Wissenschaftskommunikation muss fester Bestandteil von Wissenschaft und Forschungsförderung sein.” (Koalitionsvertrag)


Nuclear astrophysics workshop


CERN workshop

Foster passion for science, research and communication via personal interaction and with large leverage.

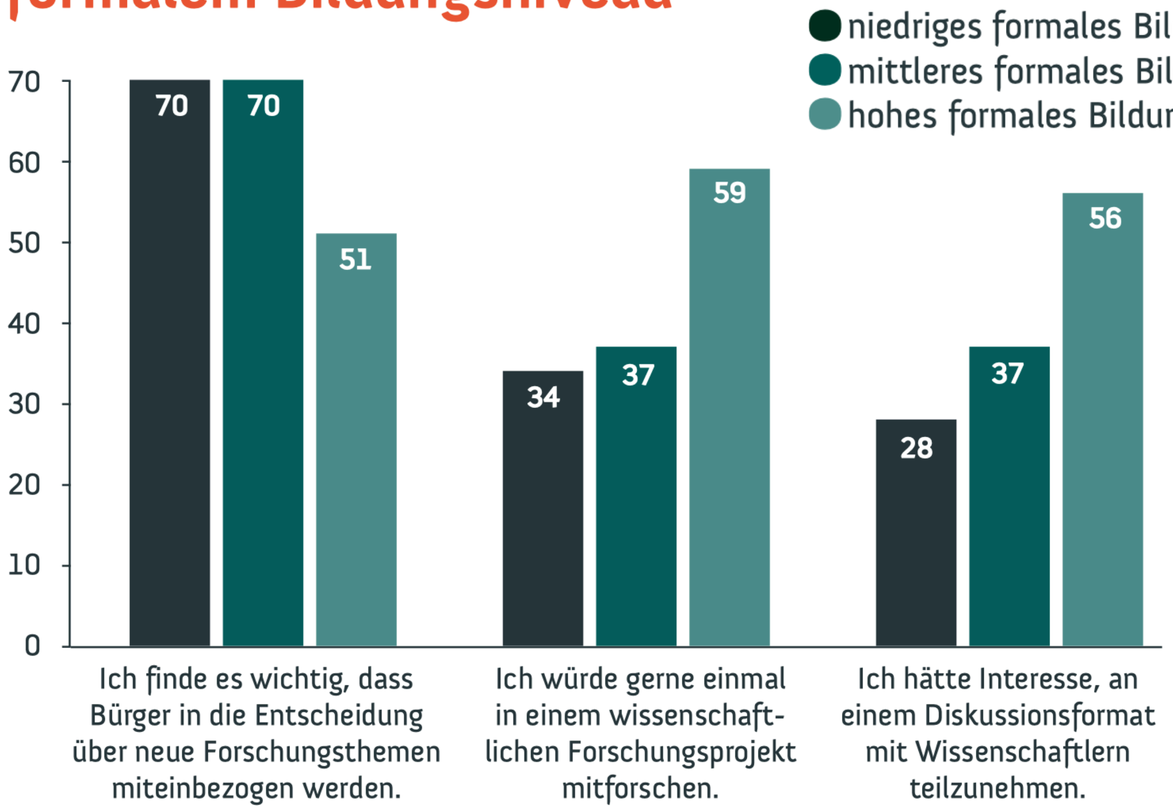
BACKUP

Participation

all ages

Participatory Science Communication

Zustimmung zur Beteiligung an Wissenschaft und Forschung nach formalem Bildungsniveau

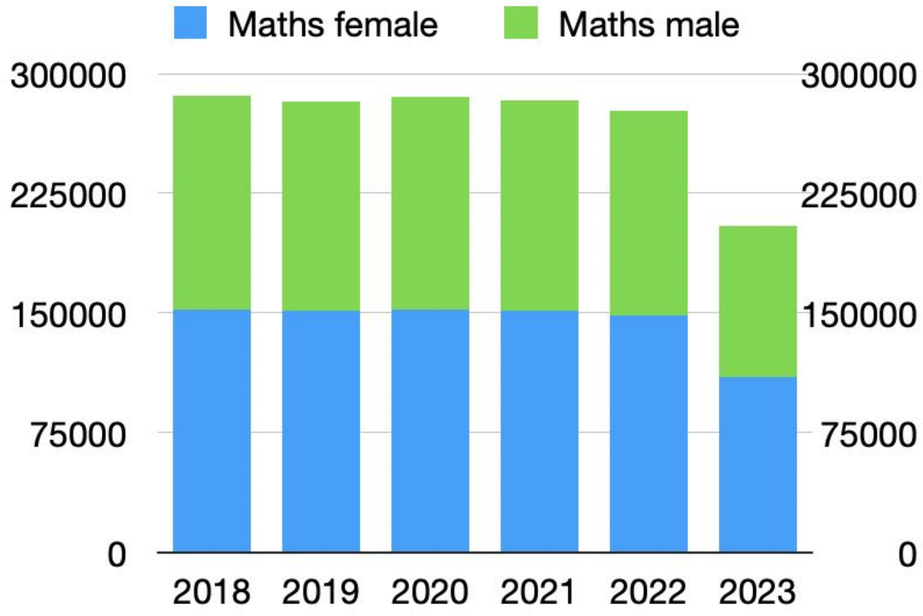


Wissenschaftsbarometer 2024

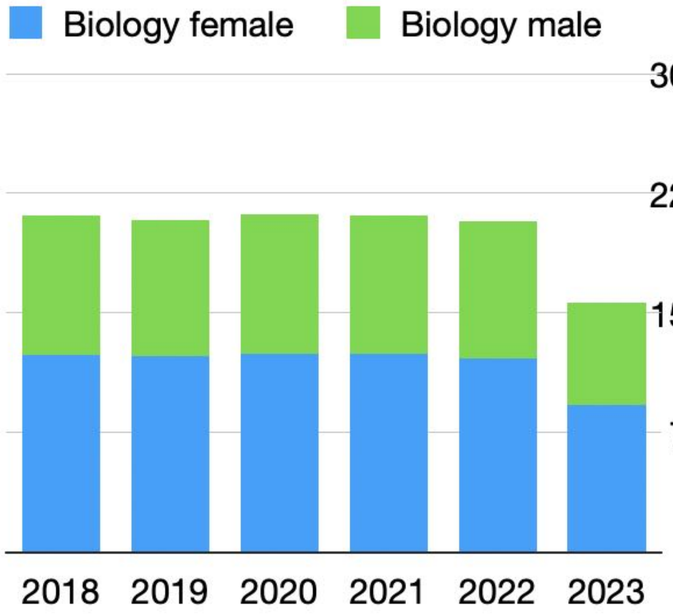
Overcoming barriers for participation is a general invest into society with potential impact on research decisions.

Physics isn’t popular

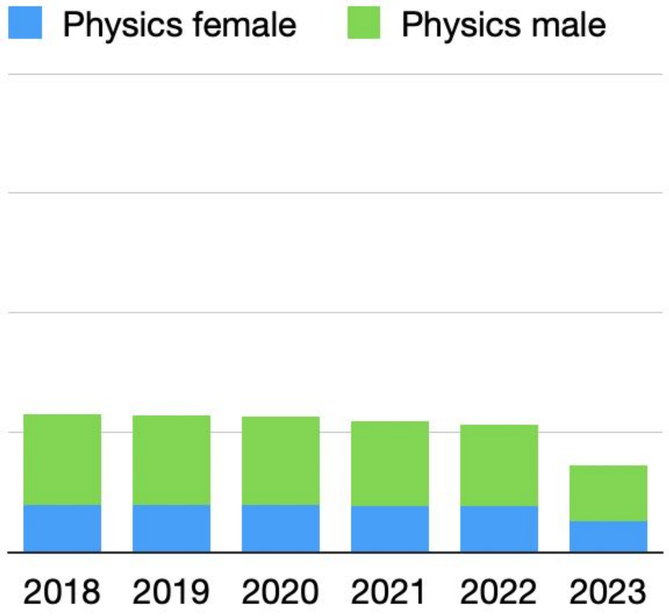
Compulsory



Popular



Physics



Chosen subjects in NRW (Sek. II)
70% do NOT choose physics (80% f)

Source: schulministerium.nrw

Punctual Interventions vs. Long Term Engagement

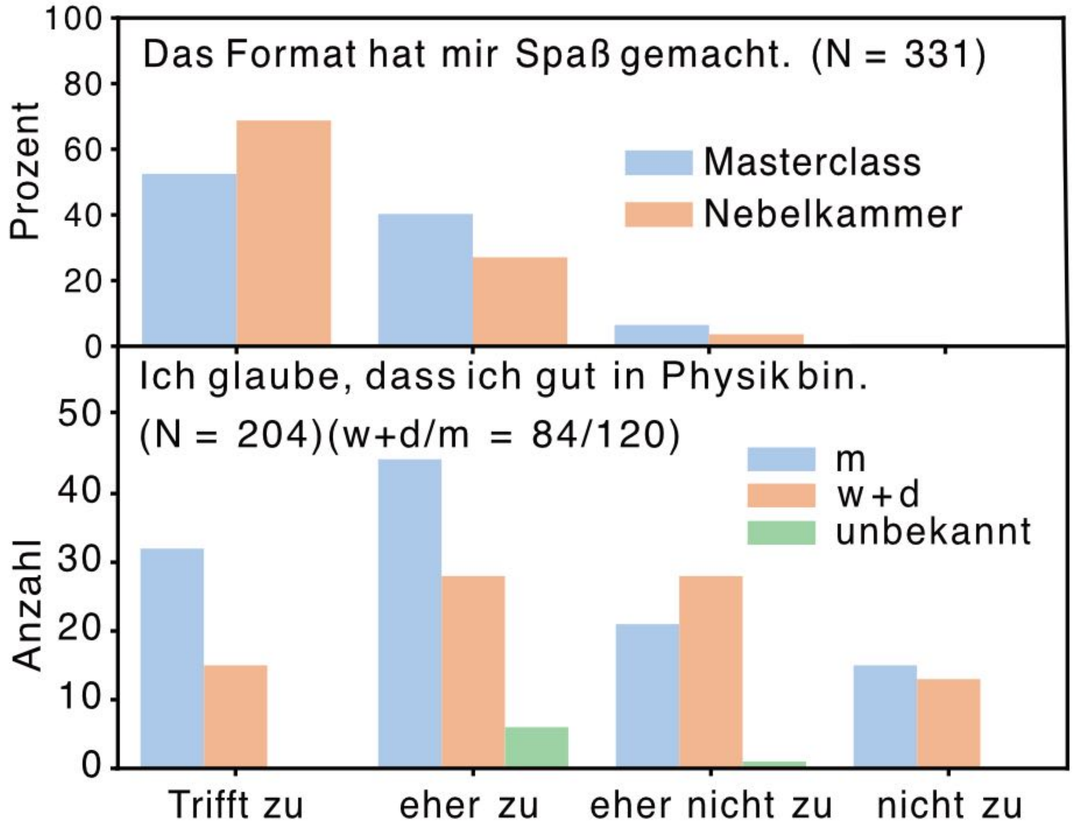
Expertise zuf Effekten zentraler außerschulische MINT-Angebote

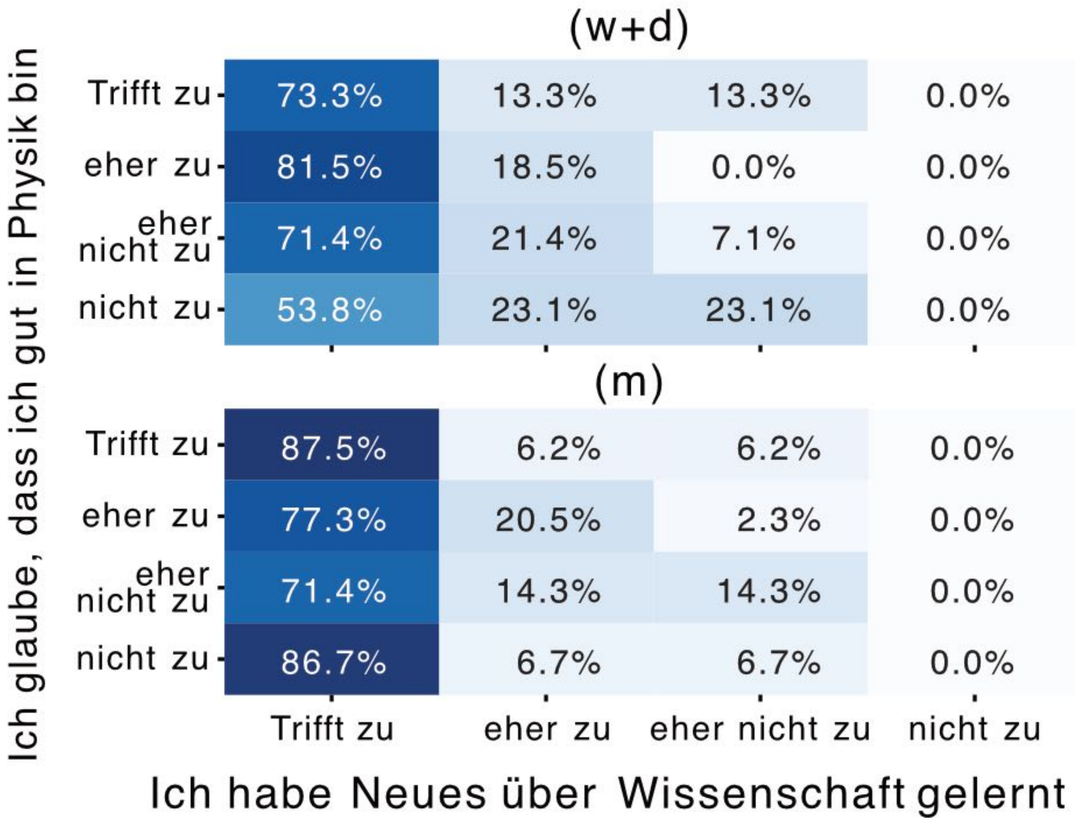
„So ist gemäß der Befundlage davon auszugehen, dass eine einzelne Maßnahme in der Regel nur wenig langfristige Wirkungen zeigt, bei verschiedenen sukzessive aufeinander **aufbauenden Maßnahmen** aber möglicherweise k**umulative Wirkungen** zu erwarten wären.“

MINT Regionen in Deutschland (Körber Stiftung 2017)

„**MINT-Bildung kann nur vor Ort** gelingen. Nur wenn die Gegebenheiten und Bedarfe der jeweiligen Region berücksichtigt werden, können passgenaue und nachhaltige Angebote entlang der Bildungskette vom Kindergarten bis in die Hochschulen geschaffen werden.“

Begleitforschung



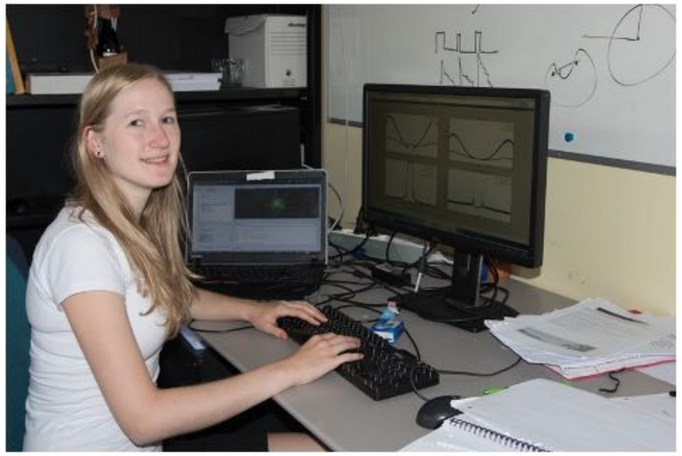


Begleitforschung
Nebelkammer SEK 1 (David Borgelt, Münster)

Long Term Impact

Survey CERN Workshops 2010 - 2014 / Current Status

- Maria M.: „Das Netzwerk Teilchenwelt hat insbesondere meine S**tudienpläne verändert** und mir die Möglichkeit gegeben den modernen Forschungsalltag kennenzulernen.“ Physik Bachelor Uni Göttingen, Master Imperial College London, Promotion, University of Oxford, PostDoc am Berkeley Lab
- Lara B.: „[...] mein Interesse für die Physik **sehr gefördert**. Da ich in der Oberstufe keine Lehrer hatte, die mein Interesse gefördert haben (eher im Gegenteil) gab es mit dem Netzwerk Teilchenwelt Leute, die mich **motiviert haben** und mir tolle Erfahrungen ermöglicht haben. Diese Erfahrungen sind sicherlich auch ein Grund, warum ich im Herbst mit meinem Physik-Studium beginnen werde.“ Physik Bachelor Uni Göttingen, Master University of British Columbia in Vancouver, PhD Student ETH Zürich



Physics and Society

320 1 13

Gefällt **teilchenwelt.ms** und **weiteren Personen**

uni_muenster In Münster, der Stadt des Westfälischen Friedens, haben sich die Physikalischen Gesellschaften von Japan und Deutschland mit einer gemeinsamen „Erklärung für die Zukunft“ an die Öffentlichkeit gewandt. Sie plädieren dafür, die Erkenntnisse der Wissenschaft für friedliche Zwecke zu nutzen und für die Gestaltung einer lebenswerten Zukunft einzusetzen. Die Physiker warnen eindringlich vor nuklearer Aufrüstung.

Die Präsidenten der beiden Gesellschaften, Prof. Dr. Seiji Miyashita und Prof. Dr. Klaus Richter, unterzeichneten die „Erklärung für die Zukunft“ am 14. November im Rathaus.

Foto: © DPG - MünsterView

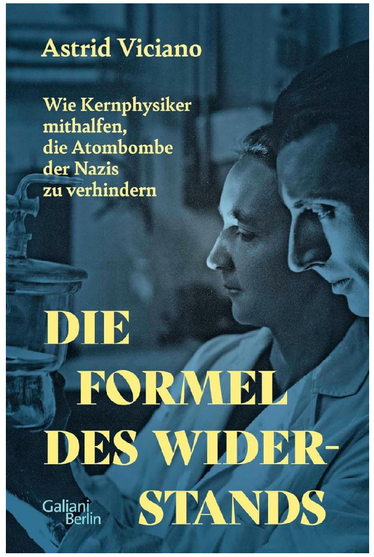
@dpgphysik @fachschaft_physik.uni_ms
@teilchenwelt.ms @netzwerkteilchenwelt

#UniMS #UniMünster #Münster #DPG
#DPGPhysik #Physik #Atomwaffen
#Atomkrieg #nuclearweapons
#atomareabrüstung

Another part of NTWs contributions to Quantum Year 2025: History of nuclear and particle physics, international research as foundation for peace
(100 Jahre Quantenphysik: Ein Chor der Wissenschaft?)

Wolfgang Gentner’s part in supporting resistance in Paris 1940 and not “Uranprojekt”

Genter: First director of CERN SC

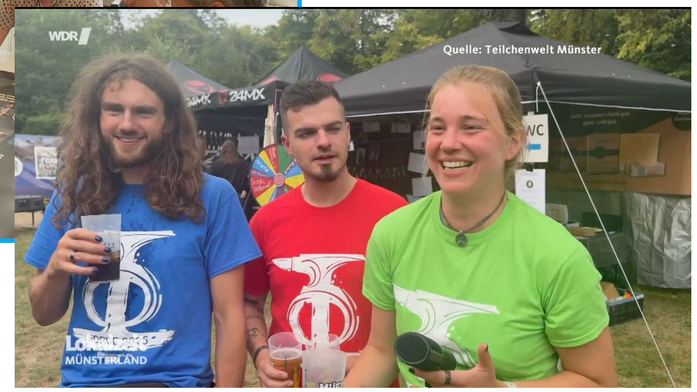


Verlagslink (galiani.de)

Author’s talk at school 2025 (link)

More Opportunities

- **Seed: NTW booth at DPG Gießen 2024 …**
  leads to particle physics booth
  at Metal Festival in Lich: 2024 & 2025
- Cloud chamber, dry ice, experiments, buttons, exhibits and T-Shirts (**Human Heavy Ion Collision**)
  (IPPOG Success Story)
- 9 persons on site Ort (Münster, Gießen, Dresden)
- 4 days talking for 8h to 1500 visitors



11.09.2025 WDR Lokalzeit (link) feature and interview

Team 2025 (2 Fellows)

@meinweinistlea Vlog (> 40 k)

Direct contact at non-academic event.
Broad reach in classical and social media.