

Status of the Gentner Programme

22nd Gentner Day

October 26th, 2022

Dominik Dannheim (CERN)



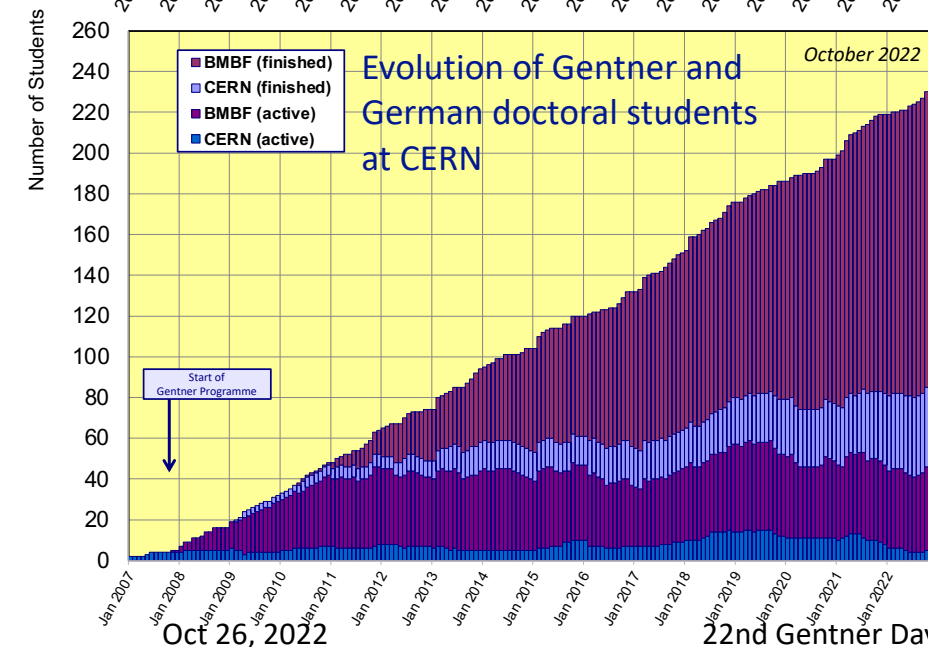
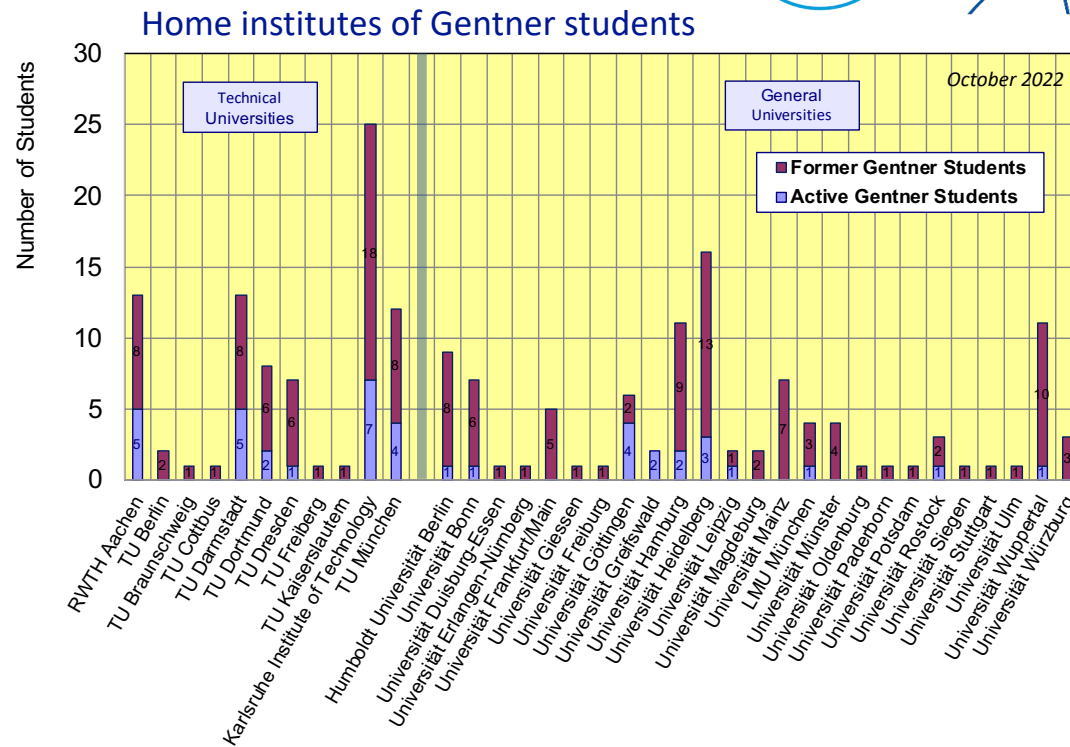
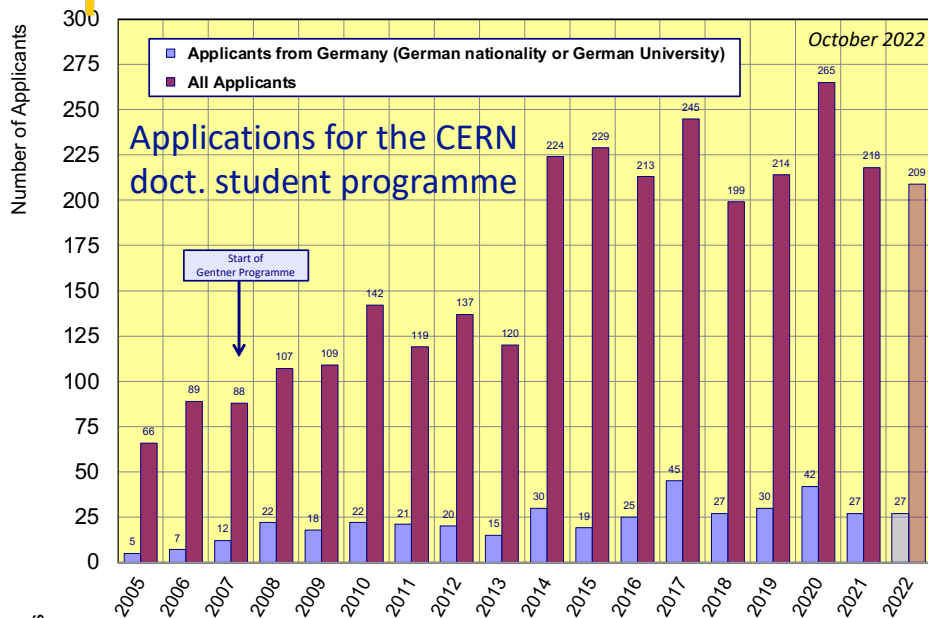
- Wolfgang-Gentner scholarship provides funding for **technical doctoral students at CERN**:
 - 36 months **subsistence** + **travel** to home institute and national meetings + **supervisor travel**
- Goals: **train students** and **strengthen links** between German universities and CERN;
increase technical staff from Germany at CERN
- Fully **embedded in CERN doctoral-student programme**:
nationals from EU member states inscribed at German Univ. are eligible
- **Selection of ~13 Gentner-funded students per year**, prior to to CERN doctoral-student selection, **3 selection rounds per year (new!)**
- Based on **trilateral agreement** in effect since 2007:
 - **BMBF** provides strategic funding (1.8M EUR / year → 39 students on average)
 - **Friederike Trimborn-Witthaut** head of division 713 Europ. Research Organisations
 - **Nikolas Knake (VDI-PT)** management of BMBF funds
 - **DESY** oversees project planning, execution, accounting, reporting
 - **Manfred Fleischer** (programme coordinator), **Stephanie Krause** (accounting, admin. support)
 - advisory committee: **Kerstin Borrás**, **Bernhard Schmidt**, **Michael Hauschild**
 - **CERN** provides technical framework, administrative and project-management support
 - **Dominik Dannheim** (programme coordinator), **Maria Kimpezi** (CERN DOCT recruitment)



Wolfgang Gentner 1906-1980
CERN synchro-cyclotron
research director 1955-59



Evolution of the Gentner programme

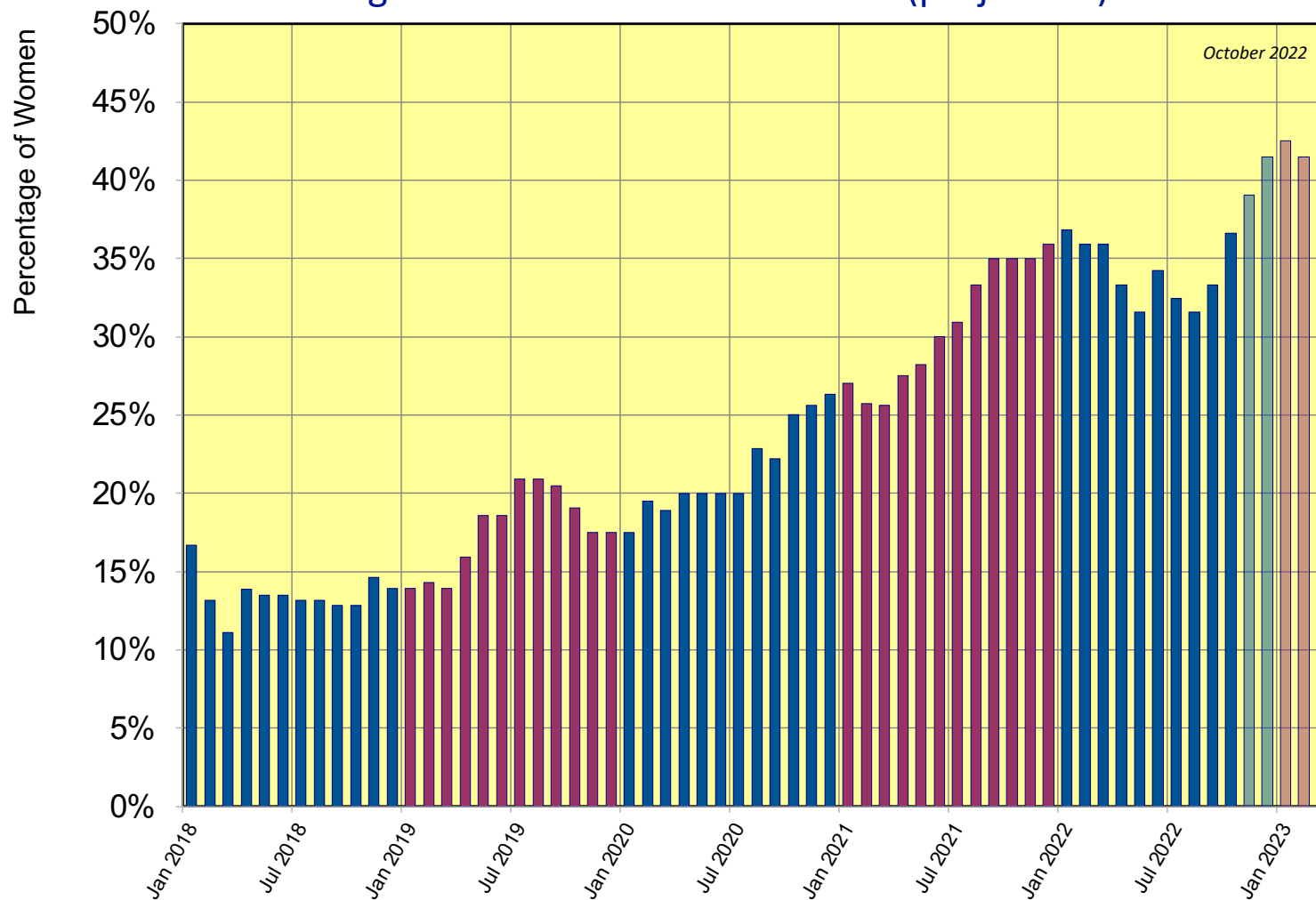


- Number of Gentner applications is **increasing in 2022** (note recent change: 3 rounds per year instead of 2)
- **Current status** (as of April 1st):
 - **41** Gentner students from **16** Universities + further **5** German non-Gentner students
 - **8** new students since last Gentner day
 - In total **186** Gentner students from **36** Universities since 2007

Gender balance



Percentage of female Gentner students (projection)

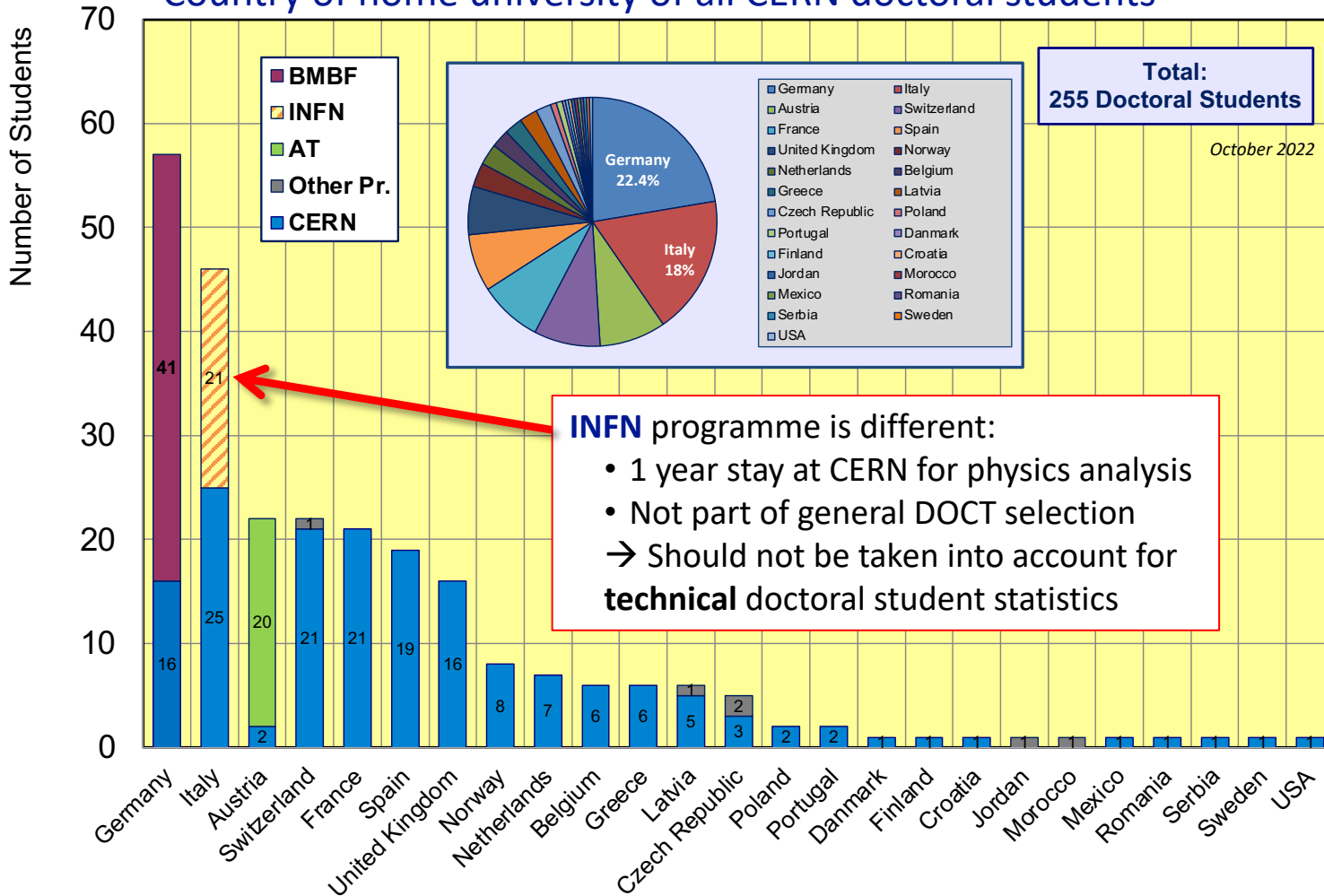


- Steady increase of female Gentner students to currently **37%** (CERN DOCT average is **34%**)
- Thanks to increasing fraction of female applicants over the years

CERN doctoral students (I)



Country of home university of all CERN doctoral students

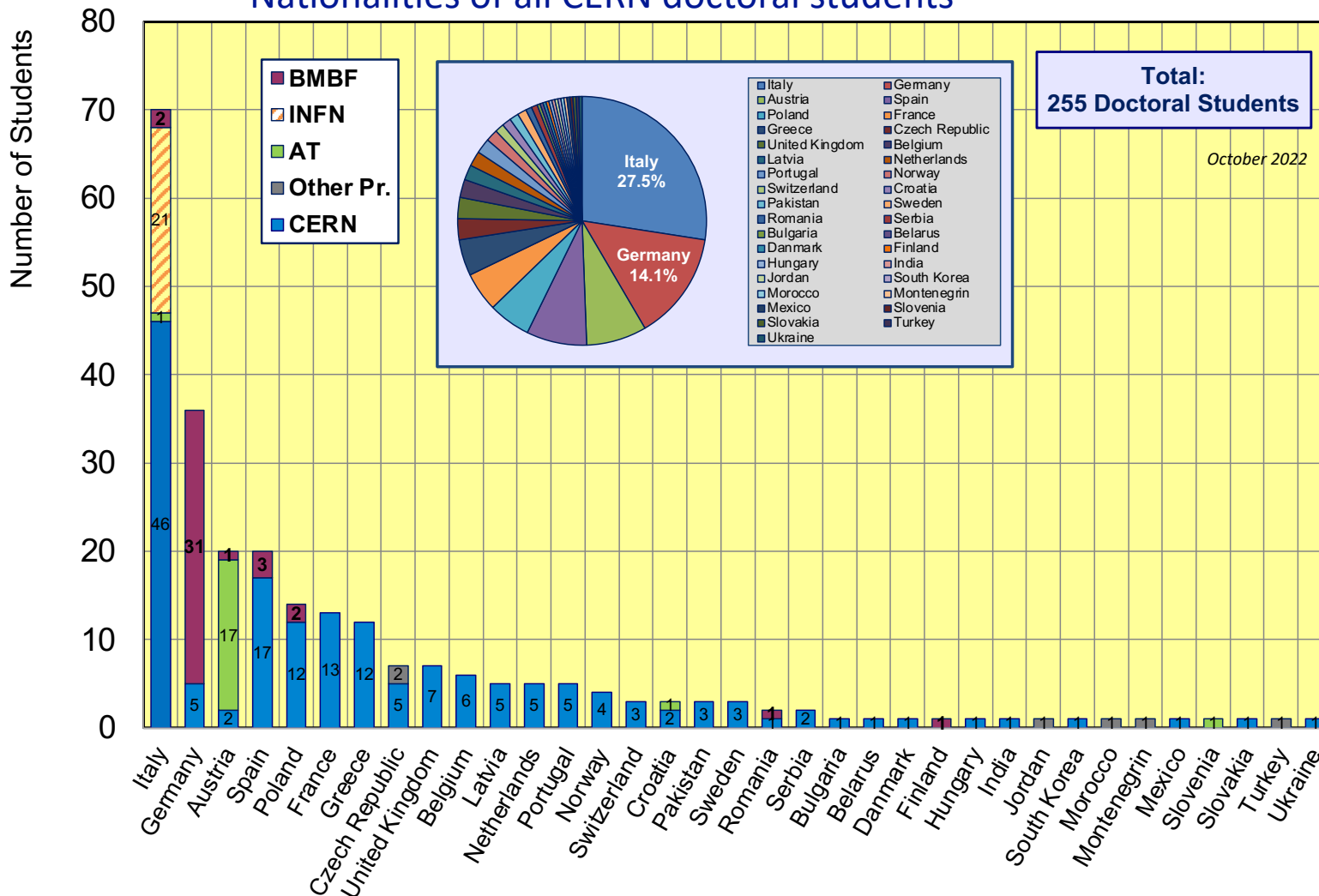


- 57 of 255 doctoral students enrolled at German Universities (**22%**)
- 57 of 234 **technical** doctoral students enrolled at German Universities (**24%**)

CERN doctoral students (II)



Nationalities of all CERN doctoral students



- Italians (**28%**) and Germans (**14%**) leading doctoral student nationalities
- For **technical** doctoral students (excluding INFN programme): Italy **21%**, Germany **15%**



Advertisement



- Success of the programme relies on sufficient number of applicants from German Universities, in particular in technical domains (engineering, IT)
- Increased outreach efforts in 2022:
 - Systematic reminders of DOCT application deadlines to various German email lists → usually leads to a few direct responses
 - Contacted student bodies of science / technology faculties at German Universities → not much feedback
 - Information session for 2022 Summer Students from German Universities → several students got interested
- Your help in advertising student opportunities at CERN is important, for example:
 - Forward reminders for DOCT application deadline within your networks
 - Mention Gentner support in acknowledgments of publications and public talks
 - Add link to Gentner web page to your talks
 - When traveling to your home university or national meetings, talk to bachelor/master students about your experience at CERN
 - Brochures + posters available (in German) from my office 1/1-044 and for download <https://cern.ch/gentner/de/brochure.php>
 - For Germans: please take part in the DAC initiative <https://german-dac.web.cern.ch/content/helft-uns-die-zahl-der-deutschen-mitarbeitenden-zu-erhoehen>
- Need to keep in mind: only limited number of Gentner scholarships are available → advertisement should not focus on specific “Gentner projects”, but rather lead to more applications from German Universities in general, that then also lead to recruitments outside of the Gentner programme

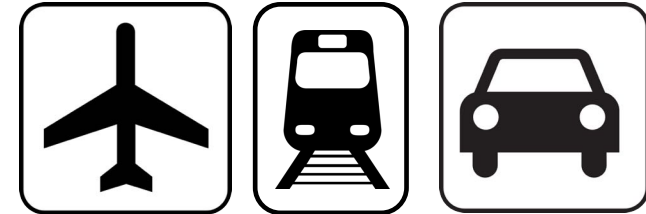




Travel



- **Travel supported** by the Gentner Programme (reminder):
 - for Students:
 - travel to home university and to German national symposia
 - for Supervisors (in Germany and at CERN):
 - travel from/to Germany for discussions with student / other supervisor
- No Gentner funding for international conferences, workshops, etc.
→ Please check with your supervisors about funding from your group for such travel



- Travel organization:
 - “Gentner travel” bound to general CERN travel rules for duty travel:
 - Mandatory [EDH TRVL document](#), tickets need to be booked through CWT travel agency
 - Reimbursement at **reduced rates**, to allow for maximum travel with limited budget
 - Rather complex administrative procedure, relies on your cooperation
 - Simplified procedure for University supervisors: travel organised by EP-AGS
- Please see travel FAQ for further details, and carefully follow the instructions:
<https://wolfgang-gentner-stipendien.web.cern.ch/wolfgang-gentner-stipendien/en/faq.php>



Working on a simplification of the Gentner travel procedure as of next year
→ Travel to be centrally managed by DESY, Stephanie Krause as single point of contact



Recognitions and awards



- **Franziska Maier** received:
 - the **LISA ITN Achievement Award** at the LISA summer school Structure of Complex Atoms 2022 for her “*outstanding research in laser spectroscopy*”;
 - a **poster award** at the Trapped Charged Particles Conference (TCP 2022) for her contribution “*High-precision photodetachment studies in an MR-ToF device*”
- **Julia Jäger** received a **poster award** at the Early Career Conference in Trapped Ions (ECCTI 2022) for her contribution “*Towards a 10-fold improved measurement of the proton/antiproton magnetic moment*”



Highly-Sensitive Photodetachment Spectroscopy in an MR-ToF Device

Motivation

Electron affinity (EA) and isotope shift measurements of the EA. Important benchmark for atomic models describing electron-atom interactions for chemistry and atomic physics.

- Up to now only EA isotope shifts between stable isotopes measured
- Demand for measurement of scarcely produced (radioactive) elements and isotopes

Further constrain atomic models for accurate calculations of the specific mass shift needed for nuclear structure studies

- Demand for higher precision as e.g. achievable with narrow-band continuous-wave lasers (with lower laser power)

Experimental Technique

Laser Photodetachment Threshold Spectroscopy in an MR-ToF device → increase ion exposure time by reprobating same ion bunch in an electrostatic ion beam trap

Summary and Outlook

- ✓ Show boost in signal sensitivity
- ✓ Obtain laser photodetachment curve for ³⁵Cl
- ✓ Measure EA isotope shift between ³⁵Cl more precisely and compare with existing measurements [6] and theory value [7]
- ✓ Measure EA isotope shift to long-lived ⁴¹Ca for the very first time
- ✓ Online measurement of a variety of radioactive samples in a dedicated MR-ToF setup coupled to a radioactive ion beam facility such as ISOLDE

Figure 1: Growth of Integrated Signal with Storage Time

Graph showing Neutralized detected ions (CYCLE) vs Storage time (ms). The signal increases from ~10 to ~40 ions per cycle as storage time increases from 100 to 400 ms. A 'Low off' line is shown for comparison. Text: '338.445 nm, 4.45 mW', 'Additional neutralization due to photodetachment', 'Trap half-life: 400 ms, to be increased by improving vacuum quality', 'Boost in signal sensitivity by ~1000 compared to conventional single-pass experiments [1]'. Source: Adapted from [1].

Figure 2: First Photodetachment Threshold Curve from an MR-ToF Device

Graph showing Ion count (a.u.) vs Photon energy (eV) for ³⁵Cl. The curve shows a sharp increase starting around 3.610 eV. Text: 'Preliminary', '35Cl', '3.610 3.615 3.620 3.625 3.630 3.635 3.640', '2 mW laser power', 'Threshold value in perfect agreement with literature [6], eventually exceeding its precision [8]'. Source: Adapted from [1].

Towards a 10-fold improved measurement of the proton/antiproton magnetic moment

Motivation

Basic symmetry of the Universe: where has all the antimatter gone?

Salisbury conditions [1]:

- Sparse nuclear velocities
- Interactions out of thermal equilibrium or CPT violation

BASE Experiment

BASE compares fundamental properties of the antiproton and the proton.

Change-to-mass ratio

Change-to-mass ratio μ_p (ppm)

Spin Flip Fidelity

New Experiment Upgrades

Upgrades for new magnetic moment run:

1. Minimize coil system
2. Increase distance between traps
3. Implementation of superconducting coils to compensate the residual B_z and E_z
4. Tunability B_z down to 0.6 mT

Current status

Goal: Decrease the cold particle preparation time as much as possible.

How to prepare a cold particle?

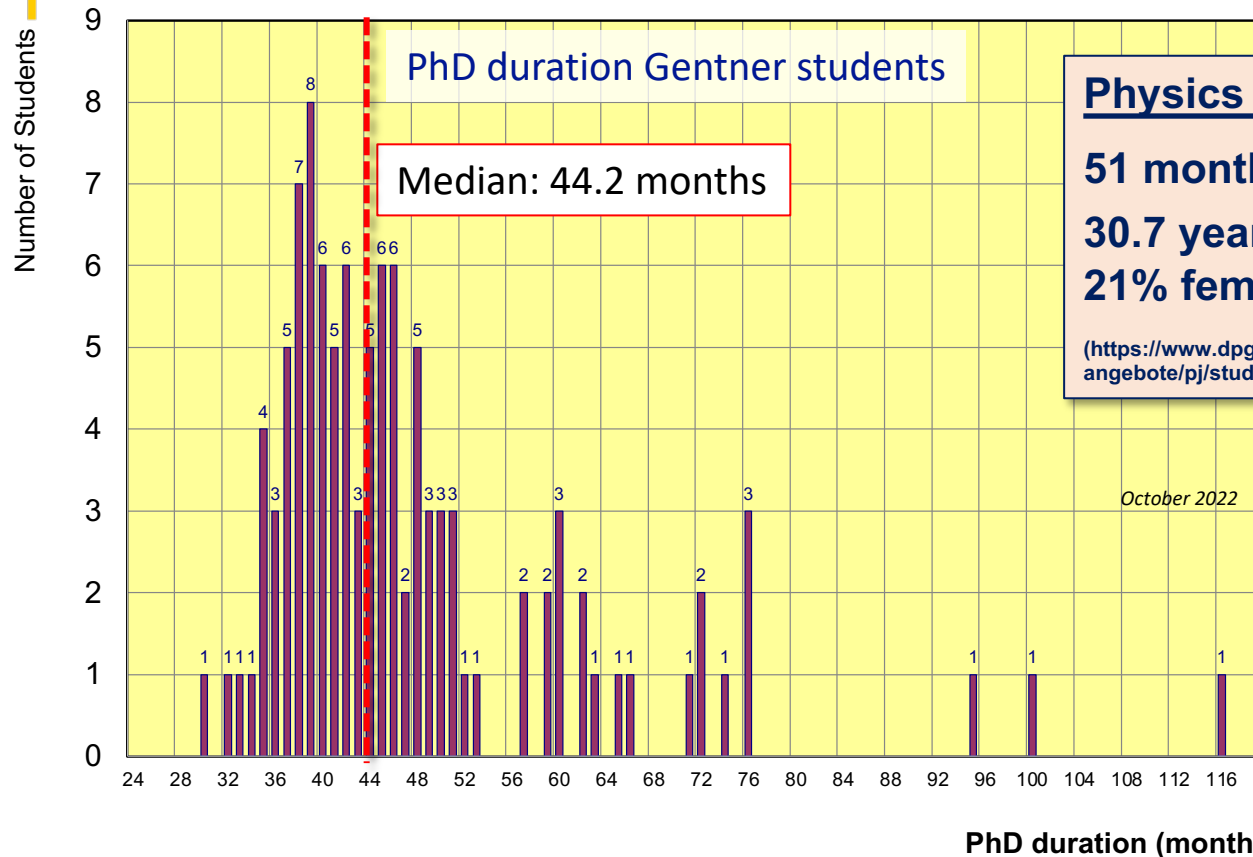
1. Read out axial frequency with FFT in AT
2. Transport to CT
3. Cool ion with Paul trap
4. Cool ion with Paul trap

Feedback Cooling

Reduced cold particle (T=200mK) preparation time from previously 15h to now 30 min by a factor of 30.



PhD statistics



Physics PhDs in Germany (2011-2021 avg.)

- 51 months duration of PhD**
- 30.7 years at PhD defence**
- 21% female students**

(<https://www.dpg-physik.de/veroeffentlichungen/magazine-und-online-angebote/pj/studierendenstatistiken/>)

List of all Gentner theses:
<https://wolfgang-gentner-stipendien.web.cern.ch/wolfgang-gentner-stipendien/de/theses.php>

- Since 2007: **108** finished Gentner PhDs, **14** cancelled PhD (13%)
 - Duration for PhD: **44.2** months (median) → **8** months after end of 3-years contract
 - Age at PhD defence: **30.7** years (median)
 - **23%** female students



Thesis planning / progress reports

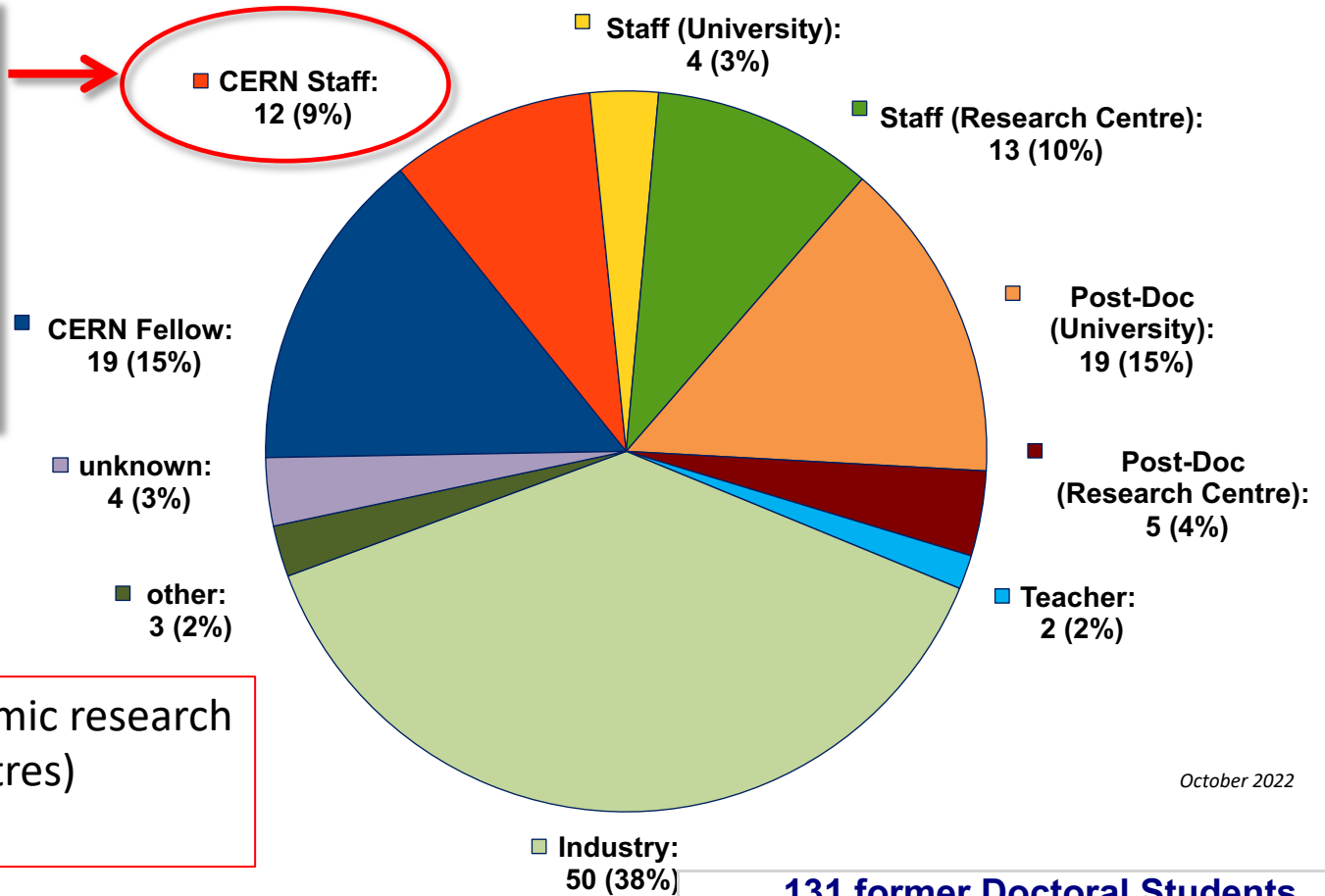


- Gentner fellowship is for a **PhD thesis** project (not just funding for work that needs to be done)
- **Duration** for PhD completion is one of the benchmarks for the success of the programme
- Target: completion of thesis document within **36 months** funding period
- Many students succeed and defend their thesis within a few months after the funding period
- In some cases it takes (much) longer, for various reasons:
 - Covid-related research delays → exceptional "Covid extensions" paid by group can be granted
 - too many unfinished projects → keep focus on thesis
 - thesis bound to external constraints (e.g. "paper thesis", availability of referees) → planning
 - new job → planning
 - personal
 - ...
- Please take advantage of the 18- and 30-months **progress reports**:
 - Discuss **thesis status** with your supervisors: What is still missing? Future work focus?
 - Consider travel to home University to present/discuss your thesis status in a **seminar**
 - Make **realistic plans** for the next reference period
 - In particular, for 30-months report:
 - Detailed **thesis outline**, iterated with both supervisors, should exist (not part of report)
 - Plans for the final 6 months focus on **completion of thesis document** and essential work (no more major new projects!)

Present employment of former Gentner students

→ today's guest speaker:
Jakob Blomer

- Gentner student in EP-SFT 2009-2011
- PhD in computer science from TU Munich on *Decentralized Data Storage and Data Processing in the Context of the LHC Experiments at CERN*
- CERN fellow in SFT 2012-2014
- CERN staff in SFT since 2015



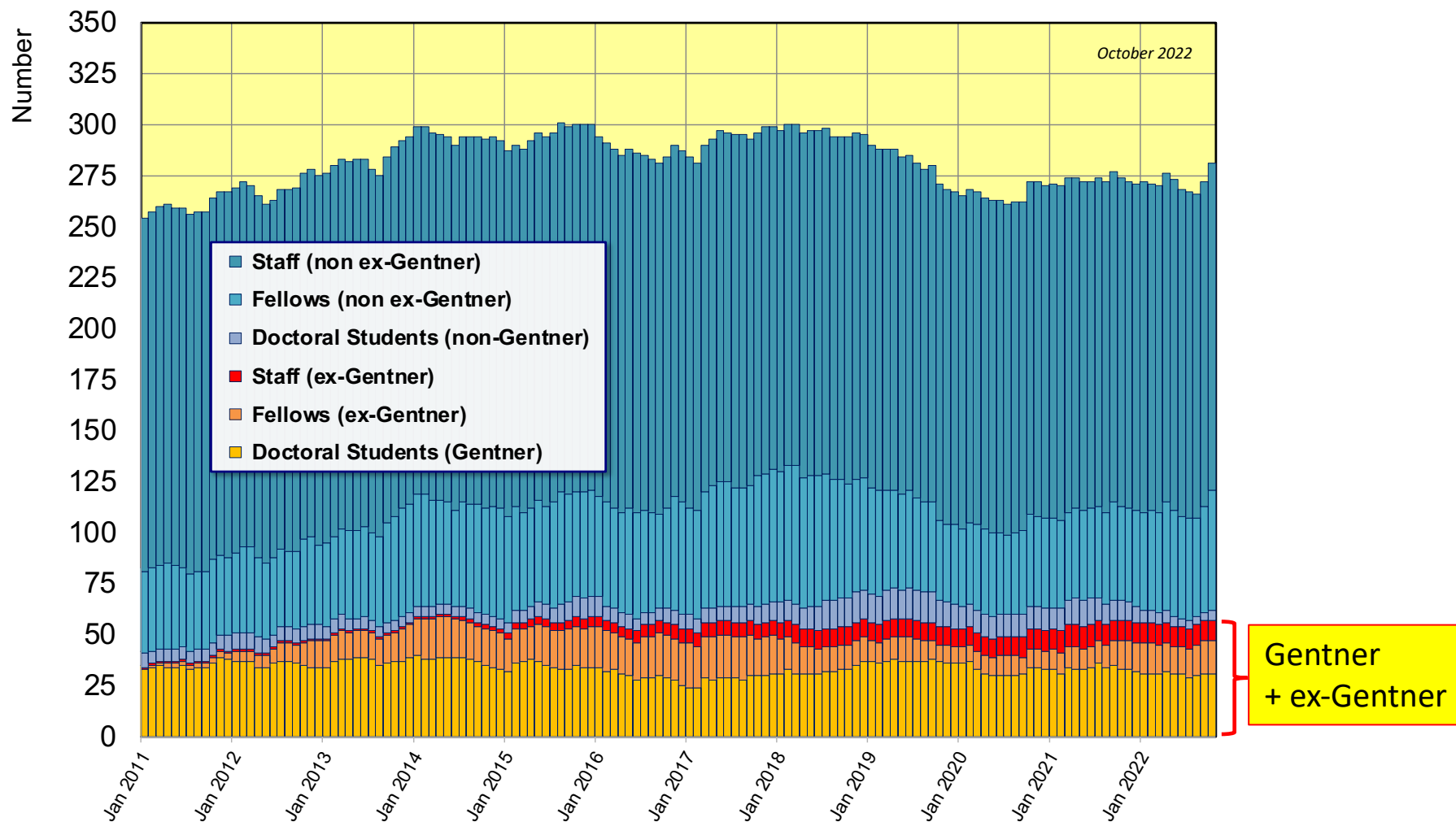
• **55%** of former Gentner in academic research (CERN, Universities, research centres)
 • **38%** in industry

October 2022

131 former Doctoral Students
 (+ 14 further Students in transition phase)



CERN careers of Gentner students



- **281** German Doctoral students, fellows and staff in total
- Of those: **36** current and **26** former Gentner students (**22%**)



How to stay connected



LinkedIn:

<https://www.linkedin.com/groups/8511060/>

The screenshot shows the LinkedIn group page for 'Wolfgang Gentner Scholarships'. The header includes the group name and a 'Manage group' button. Below the header is a 'Write a post' section with a text input field and a 'Share your thoughts and plans...' prompt. A post by Michael Hauschild is visible, mentioning a dissertation prize. The 'About' section states that the German Federal Ministry of Education and Research (BMBF) supports technical doctoral students from Germany at CERN. The 'Partners' section lists the Federal Ministry of Education and Research, CERN, and DESY.

The screenshot shows the Facebook group page for 'German Doctoral Student Programme at CERN (Wolfgang Gentner Scholarships)'. The cover image features a chalkboard with the text 'Unconfirmed E.O.L. has Nobel Prize' and 'Confirmed'. The page shows 78 members, including Henning Weiler and 76 other connections. There is an 'Invite connections' button and a 'See all' link. The 'About this group' section states that the German Federal Ministry of Education and Research (BMBF) supports technical doctoral students from Germany at CERN. The 'Start a conversation in this group' section includes options for Photo, Video, and Poll. The 'Recommended' section is also visible.

CERN Alumni:

<https://alumni.cern/topics/597/feed>

Please help us with **updates** after your active Gentner time:

- Join **LinkedIn** and **CERN Alumni** Gentner groups
- Let us know your **PhD defence date**
- Publish your thesis on **CDS** (category CERN-theses)
- Let us know of any **honors** and **awards** for your thesis
- Keep us posted on your **future jobs** and **email-address changes**

Successes of the Gentner programme:

- **Opportunities:** 186 Gentner students from 36 German universities at CERN since 2007;
- **Scientific output:** 108 Gentner PhDs;
- **Diversity:** steady increase of female Gentner students to currently ~36%;
- **Networks:** majority of CERN technical doctoral students are from German institutes (24%);
- **Careers:** 56% of Gentner students become CERN fellow, 9% become CERN staff after fellowship.

Points of attention:

- **number of applications** from Germany
- **thesis durations**

Outlook:

- 3-years **funding agreement** BMBF/CERN/DESY is up for renewal in 2023



Next Gentner Day: 26 April 2023
 and **cheese fondue** on 25 April 2023!

Upcoming DOCT recruitments in 2023:

| Deadline | TSC committee | Start dates |
|------------|---------------|-----------------|
| 07.11.2022 | 02.02.2023 | 04/2023-07/2023 |
| 27.03.2023 | 15.06.2023 | 08/2023-11/2023 |
| 31.07.2023 | 19.10.2023 | 12/2023-03/2024 |

Additional material





Overview table



| Overview: Wolfgang-Gentner-Programme | | | | |
|---|---------------------------------------|------------------|--------------------|--|
| Status: October 2022 | | | | |
| 41 active Gentner Students | | | | |
| | male: | 26 | | |
| | female: | 15 | (37%) | |
| 145 former Gentner Students | | | | |
| | male: | 112 | | |
| | female: | 33 | (23%) | |
| | PhD uncertain: | 4 | (12%) | |
| | PhD cancelled: | 14 | | |
| 186 total active + former Gentner Students | | | | |
| | male: | 138 | | |
| | female: | 48 | (26%) | |
| 108 finished PhDs | | | | |
| | | | (74%) | |
| | average PhD duration: | 44.2 | months (median) | |
| | average age at PhD: | 30.7 | years (median) | |
| Whereabouts of former Gentner Students | | | | |
| | | first employment | present employment | |
| | CERN Fellow: | 74 (56%) | 19 (15%) | |
| | CERN Staff (indefinite): | 1 (0) (1%) | 12 (4) (9%) | |
| | Staff (University) (indefinite): | 1 (0) (1%) | 4 (4) (3%) | |
| | Staff (Research Centre) (indefinite): | 1 (1) (1%) | 13 (5) (10%) | |
| | Post-Doc (University): | 20 (15%) | 19 (15%) | |
| | Post-Doc (Research Centre): | 3 (2%) | 5 (4%) | |
| | Teacher: | 1 (1%) | 2 (2%) | |
| | Industry: | 26 (20%) | 50 (38%) | |
| | Other fields: | 2 (2%) | 3 (2%) | |
| | Unknown: | 2 (2%) | 4 (3%) | |
| | | 131 | 131 | |
| | PhD Preparations: | 14 | 14 | |
| | | 145 | 145 | |