

KET Study on Careers in Particle Physics

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GenderHEP



2.1 How many permanent positions are offered in particle physics in Germany?

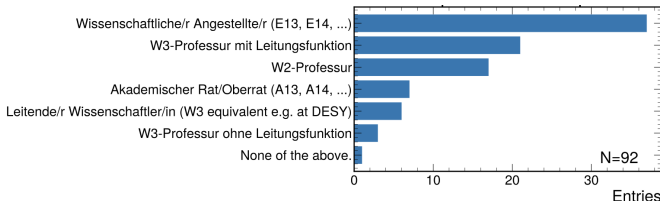
From the survey we see that at least 92 permanent positions have been filled in a good twelve years. We conclude that on average at least about eight permanent positions in particle physics are offered per year in Germany. This is in agreement with earlier estimates.

2.3 Experiment and theory

65% of the permanent positions since 2010 were filled with colleagues who worked in experimental particle physics during their doctorate and 35% with colleagues who worked in theoretical particle physics. The share of theorists is slightly higher than it is in the full community (29% according to the 2021 KET survey).

2.5 Institution

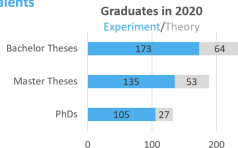
56.5% of the target group has a position at a university, 35% at a Helmholtz center, 6.5% hold a joint appointment at a Helmholtz center and a university, and 2% are employed at a Max Planck institute.



Survey of German Particle Physics Community

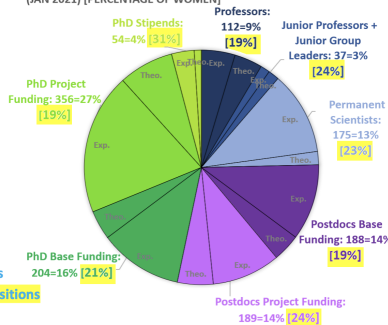
- Community Survey** (reporting date Jan 2021)
 - Universities, Helmholtz, Max Planck
- Head-count:** 939 experiment + 376 theory = 1315 total
 - 47% PhD students
 - 29% Postdocs
 - 24% Professors, Junior Group Leaders, permanent Staff

→ many young talents



- 54% base funding + 46% project funding
- 50% internationals in PhD+Postdocs, 25% in permanent positions
- 22% women each in PhDs, Postdocs, and leading/permanent positions
 - up from ~10% in permanent positions in 2014!
 - for comparison: 24% female bachelor graduates (in 2020)

PERSONPOWER IN PARTICLE PHYSICS (JAN 2021) [PERCENTAGE OF WOMEN]



2.2 How is the gender balance?

33% of those who obtained a permanent position since 2010 are women. An earlier survey conducted by KET in 2021 in the *full* community showed that the fraction of women in each of the three categories doctoral researchers, postdoctoral researchers, and leading and permanent positions is around 22%. In the third category of leading and permanent positions this represented a significant increase from about 10% in 2014. The recent hires since 2010 have therefore significantly increased the share of women in permanent positions in particle physics. The fraction of hired women is higher than their share in doctoral and postdoctoral researchers, and also beyond the share of women in bachelor graduates in physics of 24% in 2020. The fraction of hired women is very different between hires at universities (23%, excluding joint appointments with research laboratories) and at research laboratories (45%). Therefore the increase is, at least on average, mainly due to hires at research laboratories while universities hire women roughly according to their share in earlier career levels. The Helmholtz Association has two programs to recruit excellent female scientists to their laboratories with an association to a German university, see Section 4.2.3. These positions likely contribute to a higher fraction of women hired at the laboratories.



2.15 International experience

During their doctorate, 51% of the target group spent at least three months of research time outside Germany. During the postdoctoral phase between the end of the doctorate and the first permanent position, 80% worked outside Germany for at least three months. The median duration of the time abroad during the postdoctoral phase is 36 months. The survey did not ask for employers or funding sources during the research stay abroad.

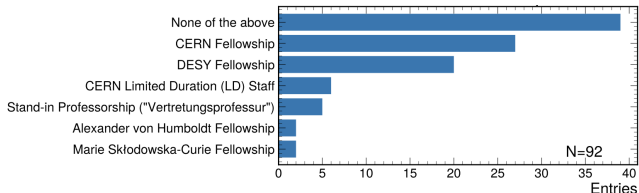


Figure 4: *Types of fellowships granted to members of the target group prior to assuming their permanent position in Germany (multiple answers were possible).*



Time scale

Dataset

Gender

Career paths

Factors

Discussion

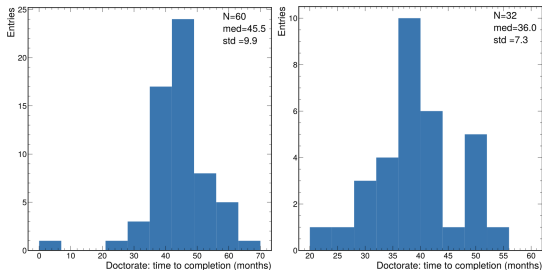


Figure 2: *Duration of doctorates in experimental particle physics (left) and in theoretical particle physics (right).*

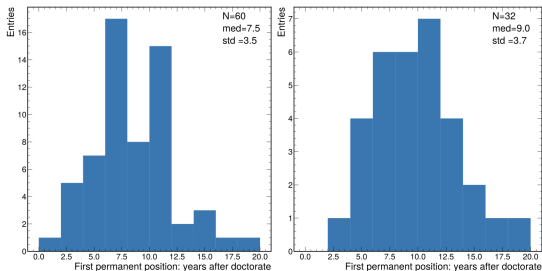


Figure 3: *Number of years between conclusion of doctorate and first permanent position in experimental particle physics (left) and in theoretical particle physics (right).*



Career factors

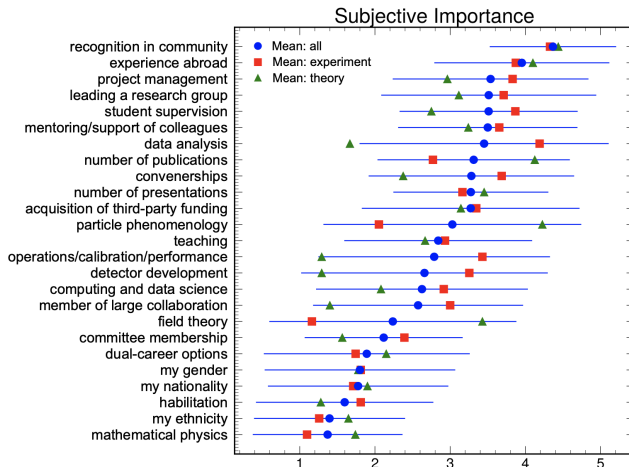


Figure 7: *Subjective importance assigned to various factors for obtaining a permanent position, on a scale from 1 (not important) to 5 (very important). The factors are sorted by the mean importance of the entire target group (blue circles). In addition the plot shows the standard deviation of the entire group (error bar) as well as the mean for colleagues currently working in experimental physics (red squares) and in theoretical physics (green triangles).*



Research, teaching, administration

2.16 Teaching: Time commitment and subjective importance

The fraction of time spent on teaching during the doctoral or postdoctoral phase has a large spread in the target group. We define the teaching fraction as the percentage of full working hours averaged over the entire year. For doctoral researchers we only consider classroom teaching and laboratory courses, while for postdoctoral researchers we also consider day-to-day supervision of doctoral researchers as part of their teaching. During the doctoral phase the median teaching fraction is 5% in experiment and 8% in theory, with 25% of the colleagues not having done any teaching in that phase (these are included in the median here and in the following). During the last non-permanent position the median fraction of time spent on teaching is about 10% in experiment and 7% in theory, with 12% and 34% of colleagues without teaching activities, respectively. Overall, 90% of the target group had experience in teaching before they obtained a permanent position.

44% of the target group consider teaching “beneficial” or “somewhat beneficial” for their career in general, while 12% consider teaching “harmful” or “somewhat harmful” for their career. When asked how important they consider teaching experience for obtaining their first permanent position, 51% of the target group replied “somewhat important” to “very important”, while 14% replied “not important”. For those who obtained professorships, the results are compatible with the overall results. A difference is observed between persons working at a research laboratory (33% at least “somewhat important”, 23% “not important”) and those working at a university (65% at least “somewhat important”, 8% “not important”).

2.20 Current areas of activity and time commitment

The fraction of their time that members of the target group spend on research in their current position varies widely between 5% and 100%, with a median of 55% (50% at universities, 62.5% at research labs). 84% of the target group are teaching, with a median fraction of 20% of their time (including those who do not teach), where the median teaching commitment is very different between universities (30%) and research laboratories (5%). The time for administration (committees, administration of grant proposals, etc.) occupies between 0% and 80% of the target group's time, with a median fraction of 20%.



Theory?

Theory-specific questions

- Who will get hired in the future and for what?
- Universities likely more relevant than labs?
- What do we expect from faculty positions?
- Teaching-research-admin the goal?
- Gender: leaky pipeline a fair mechanism?
- Will general diversity become a factor?
- Is just based on performance?
- What are the mechanisms behind becoming a job candidate?
- How international is the hep-ph job market?

