Closeout

FH Retreat Followup

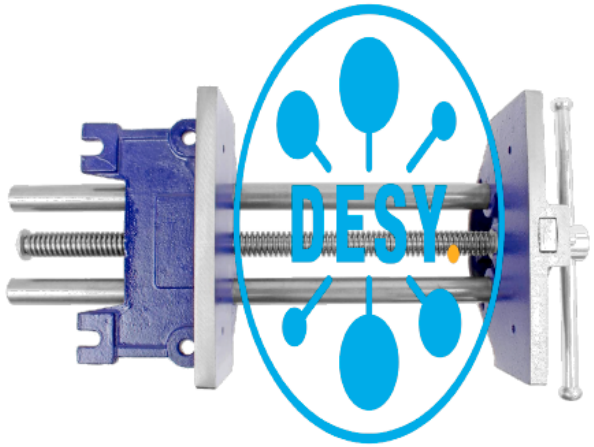
B. Heinemann, December 14th 2022

HELMHOLTZ

DESY.

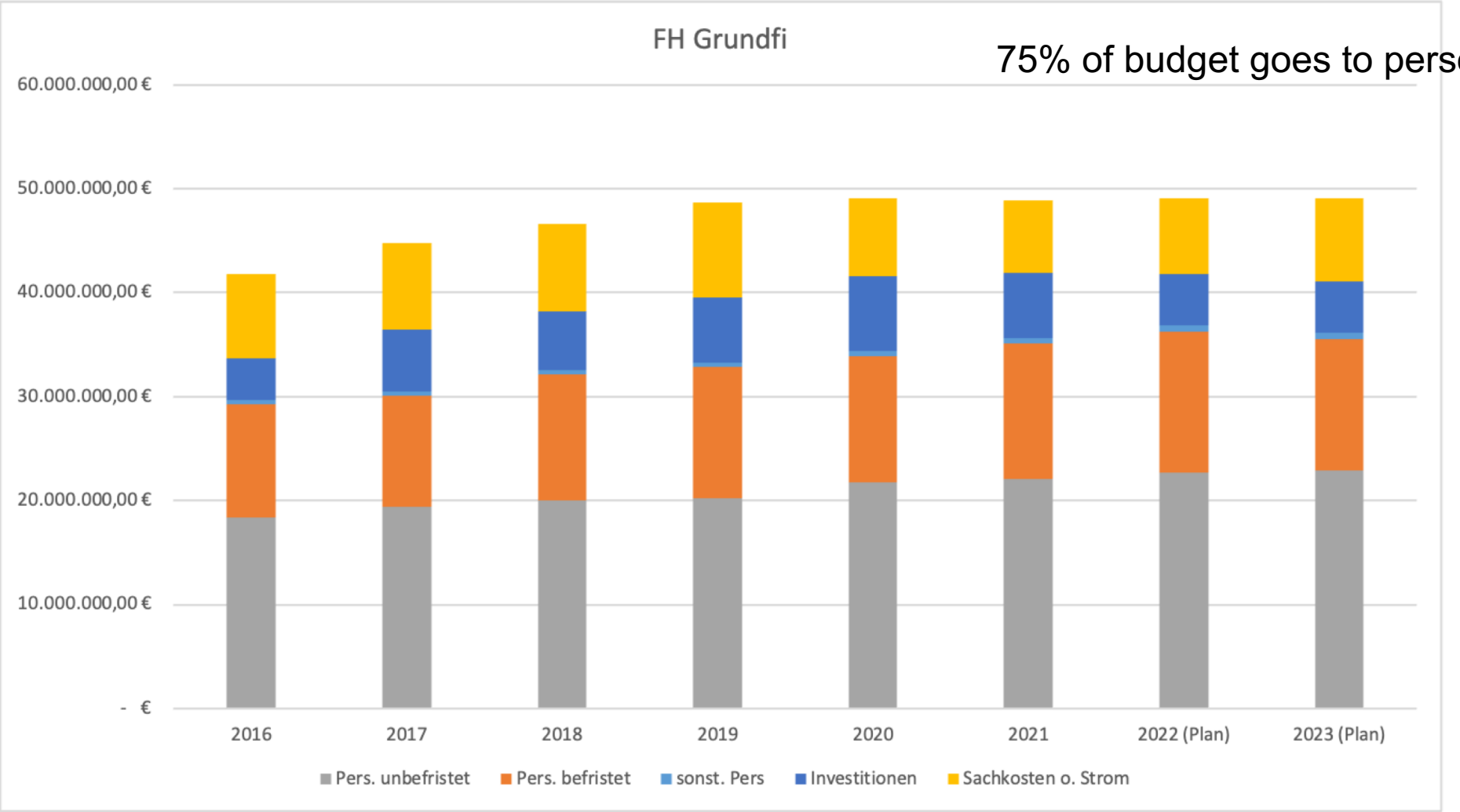
Difficult times ...

Challenges



- **Energy crisis and inflation severely impacts DESY**
  - DESY: 150 GWh, 80% accelerator operation [+EU.XFEL: 66 GWh]
  - Still unclear if accelerators can run as planned in 2022
  - Reduction in personnel by ~15% by 2027 due to expected inflation and salary raises
    - Need to avoid that this is achieved only by reducins postdocs and students!!
- **Russian attack on the Ukraine**
  - Sanctions directly affect several experiments strongly, e.g. BabyIAXO, LUXE, CMS, …
- **Further challenges**
  - Shortage of gas (e.g. Helium), long delivery times, volatile construction market, …
  - Shortage of manpower (current sicknesses due to several viruses & tech. manpower shortage)

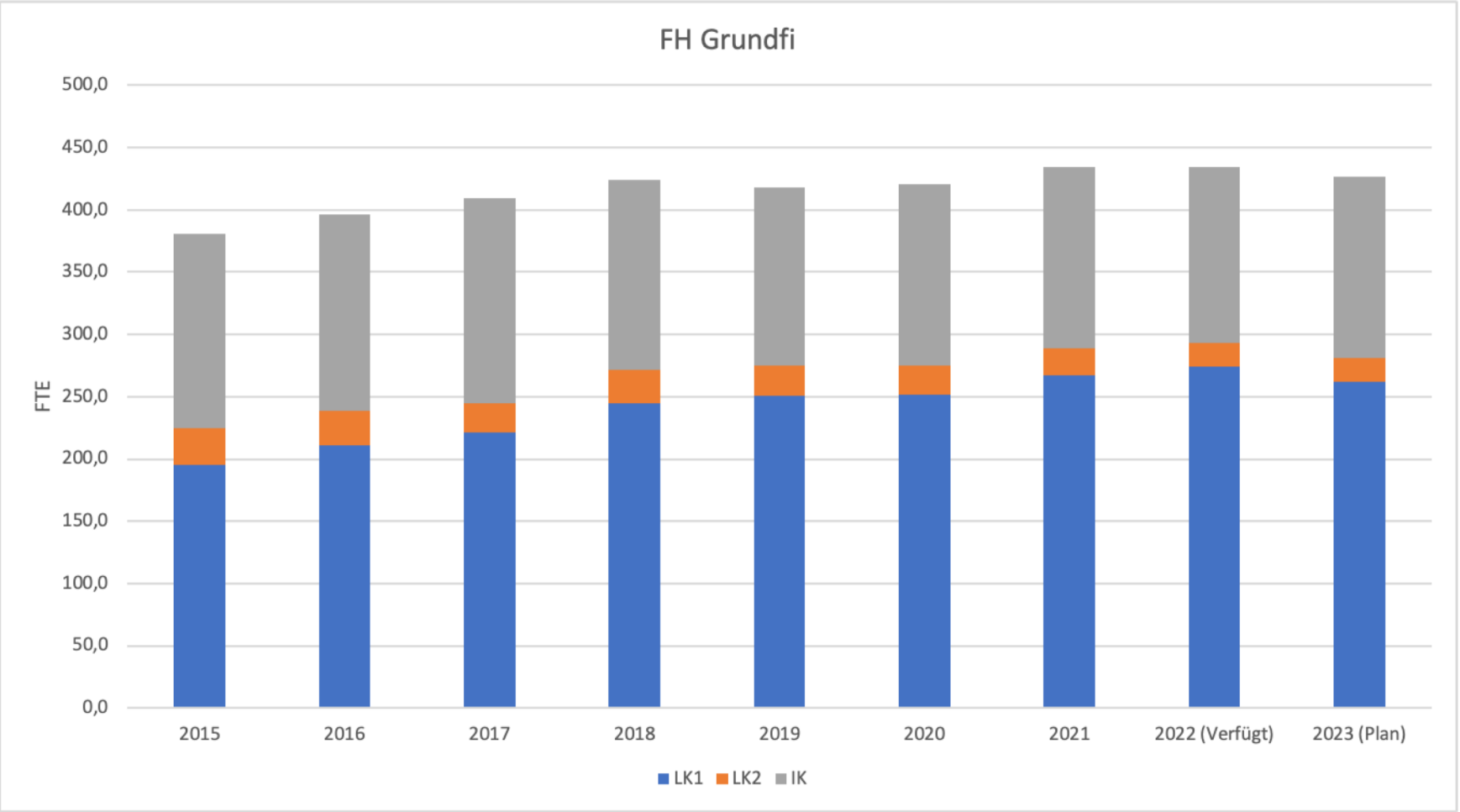
Financial Volume



75% of budget goes to personnel

K. Büßer

FTE: LK1, LK2 and IK



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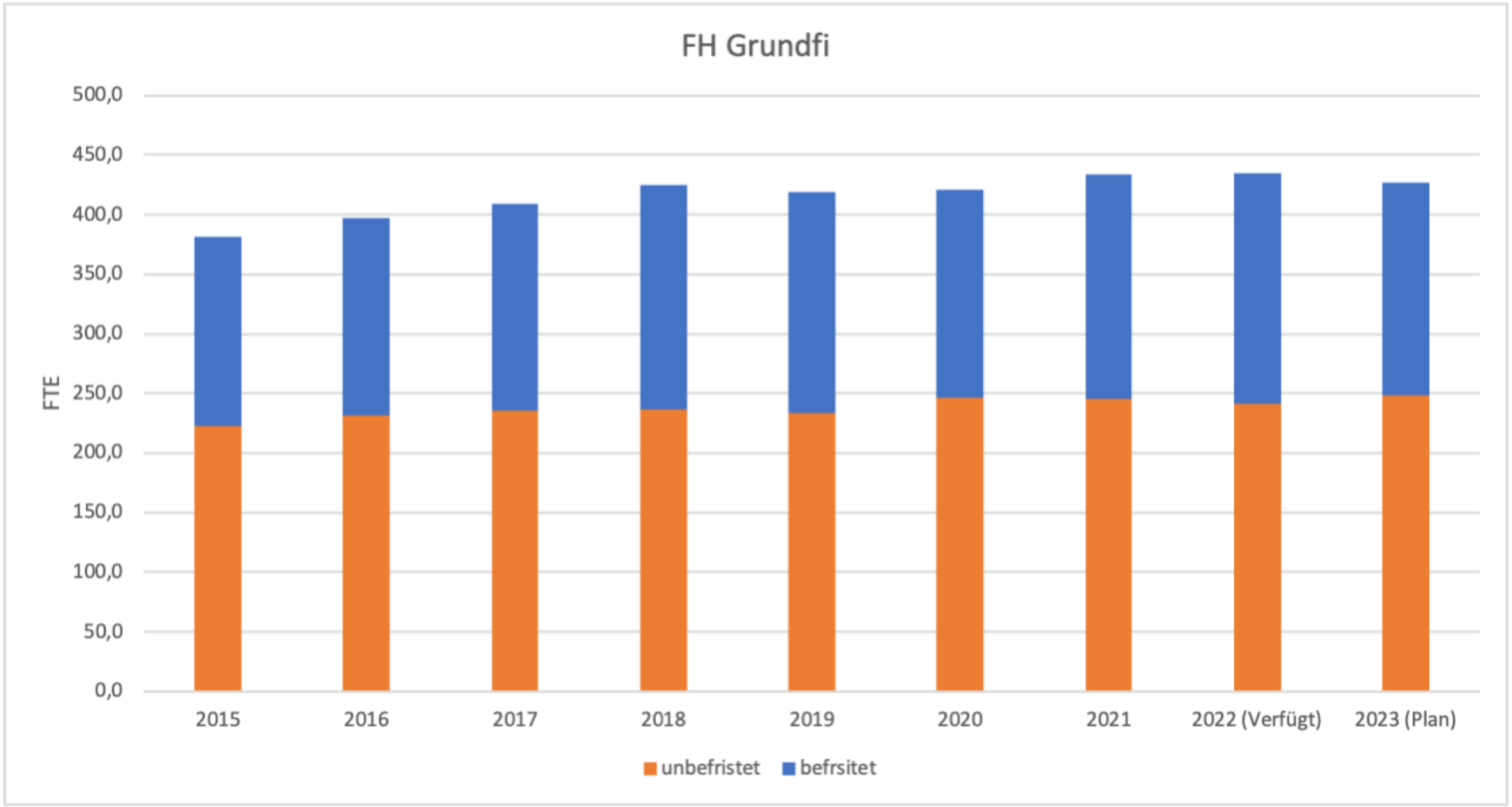
IK: infrastructure

LK2: user service

LK1: research

* Decrease in IK due to PR leaving FH

FTE: fixed term vs unlimited



180 fixed term

250 unlimited

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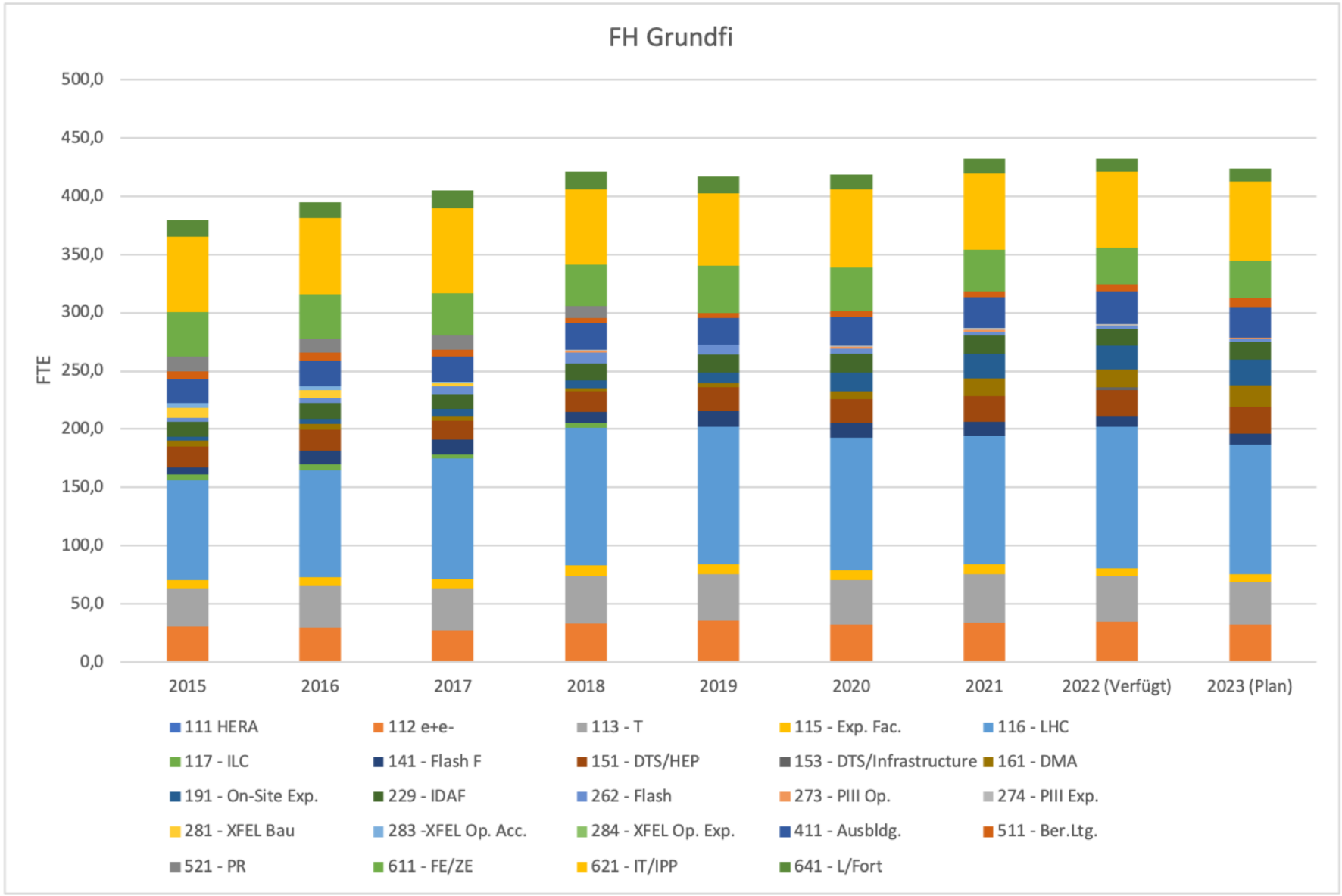
FTE by area



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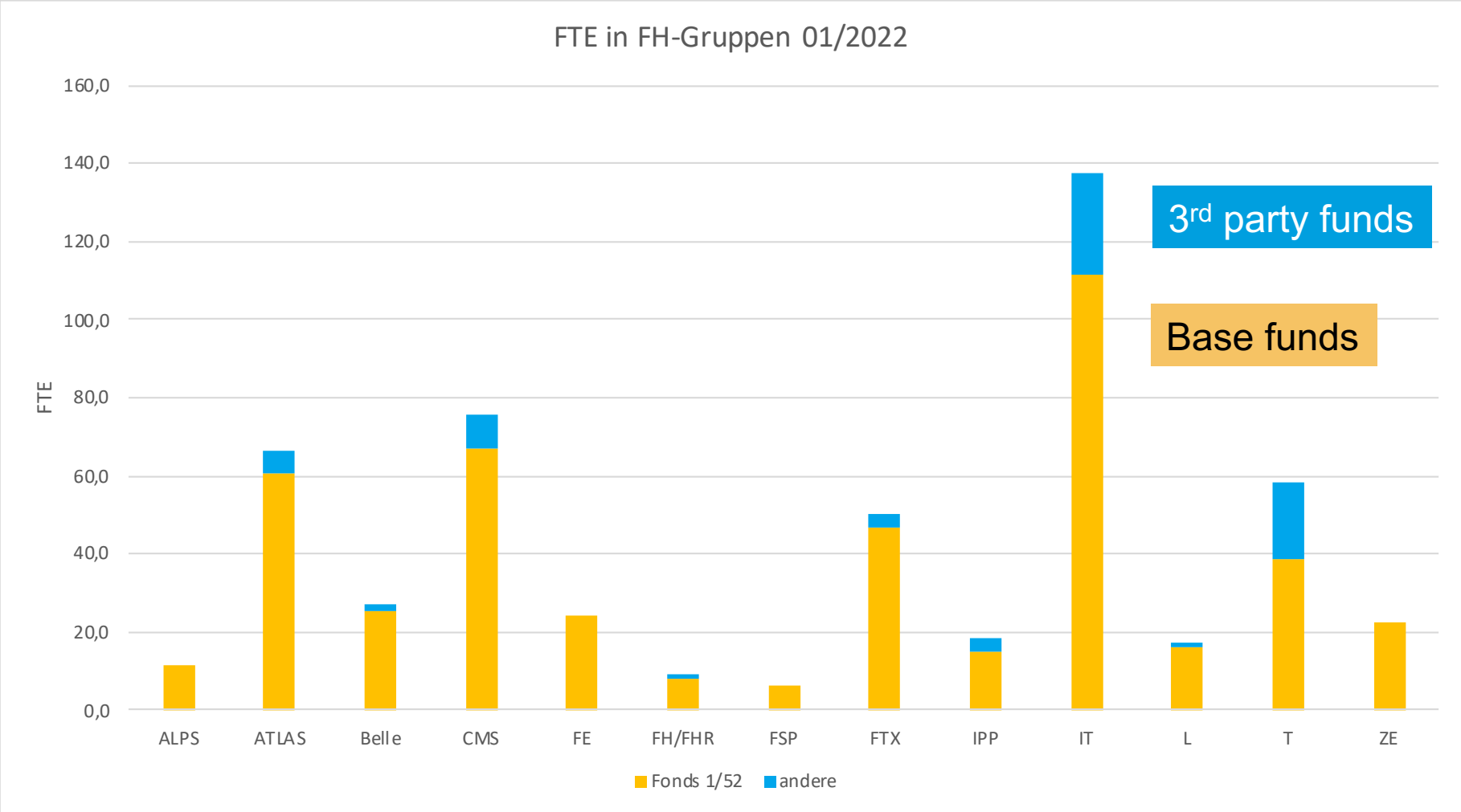
FTE-Distribution FH 2022



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Measures for 2023 budget (and beyond)

For now…

- Delay/stop filling of positions that become free where possible
  - E.g. when retirement etc.
- Reduce number of fellow from about 20 per year to 12 per year
- Reduce number of PhD students on base funding by about 50%
- Increase travel money as it was too tight last year

Planning on experimental programme

LHC

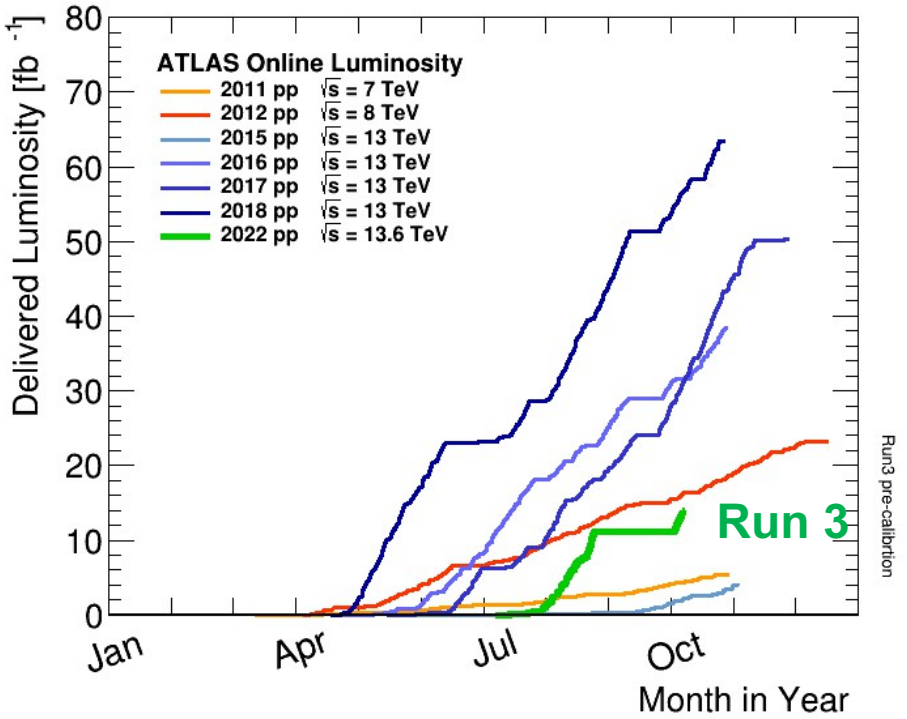
Overview

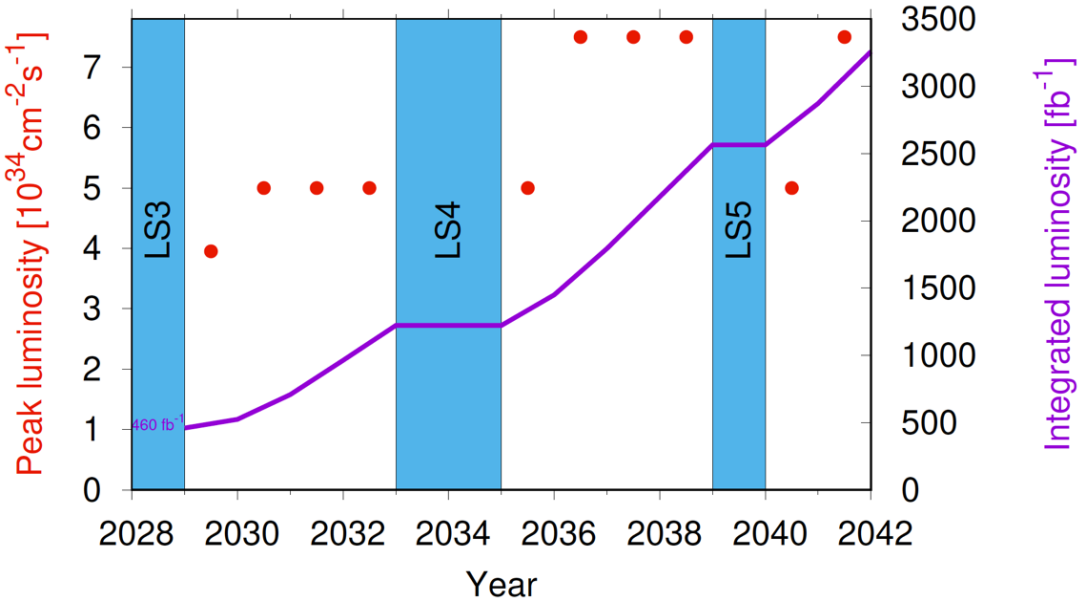
LHC Run 3 (2022-2025)

- New center-of-mass energy: 13,6 TeV
- Double luminosity (300/fb)
- New detectors and better/faster software
- Data analysis: new ideras, follow-up on anomalies

HL-LHC (2029-2042)

- Factor 10 more luminosity t (3000/fb)
- Upgrades of detectors & new computing modell
  - We have major commitment here
- Data analysis: Higgs potential, Higge precision, new search potential, ...





Commitments: ATLAS und CMS am DESY

Responsibilities and Manpower required

Tracker Endcaps:

- Until end of 2025: ca. 25 FTE/year/experiment
- Installation and Commissioning 2026-2030: 15 FTE/Exp
- Beyond 2030: 10 FTE/Exp for operation, ..., calibration

Operation, Software und Performance: 20 FTE/exp

- DESY-Commitments in Tracking-Software, Alignment, Elektron/Photon-ID, Tau-ID, Luminosity...: ca. 20 FTE/exp

Data analysis: ca. 25 FTE/exp

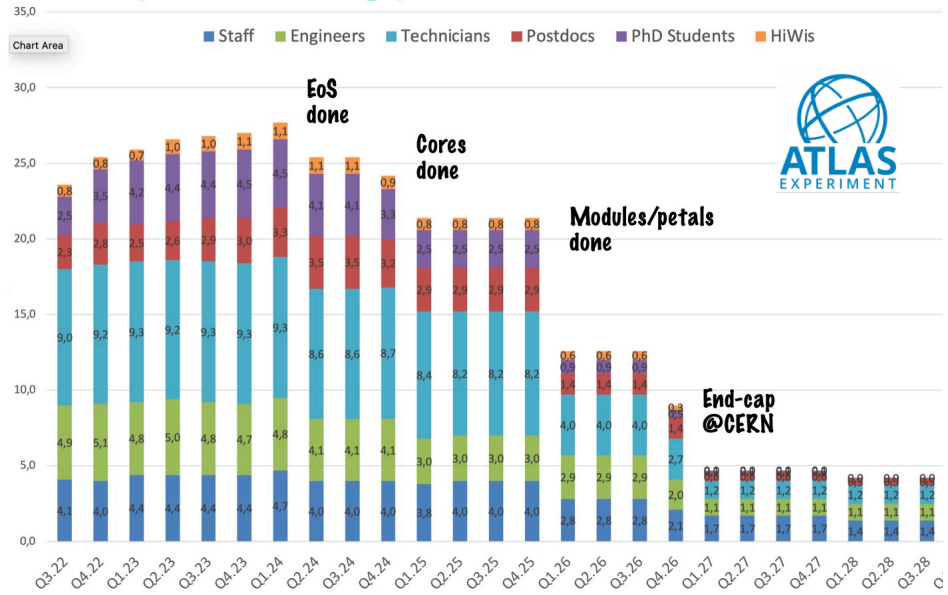
- Typically carried out by PhD students and postdocs under supervision of staff

Computing

- 0.8M Pledge ("constant budget" in contract witht WLCG)
- Applying for special contribution in 2027 with KIT and GSI to take over storage from the university Tier2s

ATLAS tracker endcap construction

FTE



Year	Min #FTE required per experiment
2022	70
2027	60
2030	55

Belle II

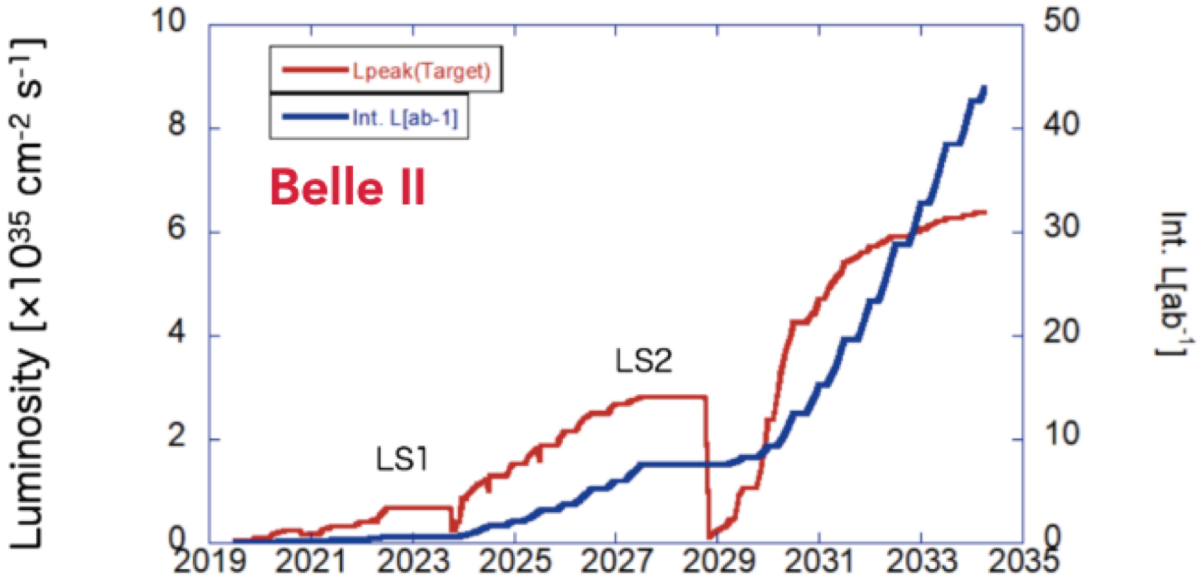
Overview

SuperKEKB physics run: 2019+

- Difficulties to reach to design luminosity
- Integrated Luminosity: L=0.4/ab

Now: Shutdown until autumn 2023

- Several improvements to accelerator to increase the luminosity
- New beampipe and new pixel vertex detector (PXD2)



Integriated Luminosity: Goals

- End of 2027: 6/ab
- End of 2034: 45/ab

	Achieved	Design goal	New goal
Peak L (10^{35} /cm^2/s)	0.5	8	≈6.5

Belle II at DESY: Commitments

Responsibilities and Manpower required

PXD2 detector testing, commissioning, calibration, installation (5 FTE)

- Important contrinution, together with german universities and Max-Planck institute for phyiscs
- Should be finished by the end of 2023

Other major responsibilities (9 FTE)

- PXD(2) detector operation and analysis, Computing: Tier 1, Collaborative tools, Tracking-Software & Alignment

Physics analyses related work (13 FTE)

- B- and Tau-Physics: Lepton Flavor Universality, matter-antimatter asymmetry...

After 2024: reduce group from 27 FTE to about. 22 FTE

- PXD2-Installation and -Commissioning finished
- Finish Dark-Sector-Analysis and contributions to calorimeter software

High scientific motivation to continue Belle II until ~50/ab are reached (2034)

- Must watch luminosity development carefully
- Unclear if/how to contribute to an upgrade later this decade

Future Off-Site Projects

Beyond 2027

A Higgs factory is highest priority in particle physics

- European Strategy of Particle Physics & Snowmass in den USA (P5 to report in Octt. 2023)
- Several project envisaged/planned in Japan, China, at CERN and in the USA
- Should also provide path towards the multi-TeV-Regime (100 TeV pp or 10 TeV ee/mumu)

Expect convertgence on collider at CERN during EPPSU 2027

- Political decision at the end of the decade
- Japan or China could act earlier

DESY is in a strong position to contribute

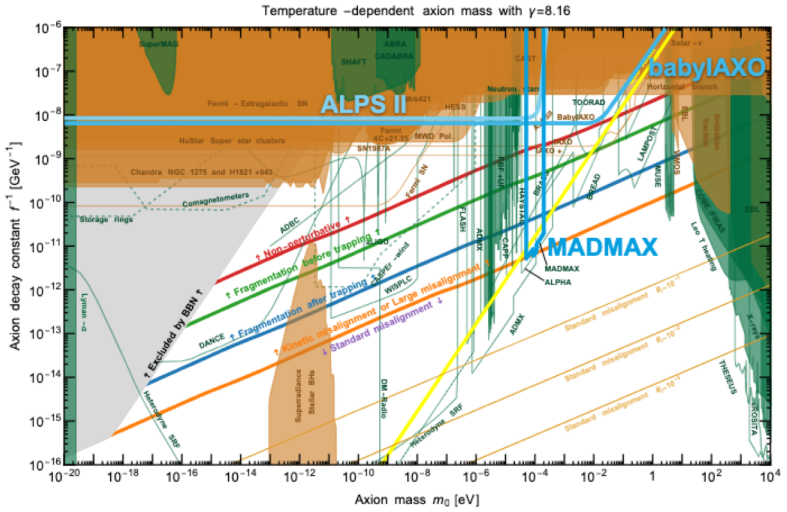
- Also mentioned time and again in SC, SAB, ...
- In particular to ensure that Germany profits from the new collider (industry, brains, ...)

Or are there other good opportunities for DESY?

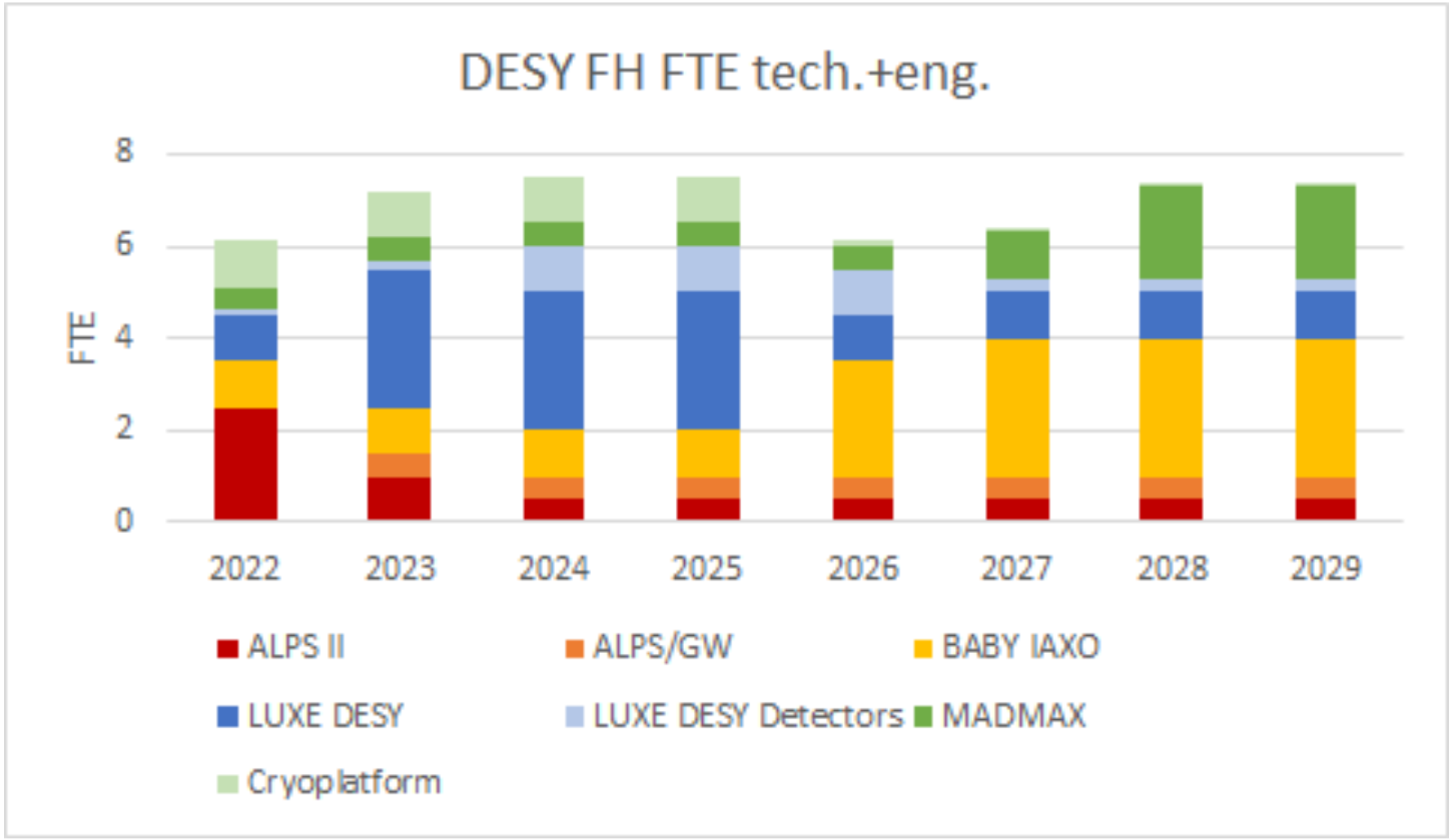
- DUNE at FNAL: further delayed and descoped though
- LHCb: B-Physik am LHC (but maybe Belle is more interesting?)
- Smaller dedicated experiments, e.g.. FASER (TeV Neutrinos), mu2e oder mu3e (lepton flavor), ...

On-site HEP experiments: Status

- **DESY as world-leading lab of axion physics**
  - ALPS II
  - BabyIAXO
  - MADMAX
- **Non-linear QED**
  - LUXE: measure transition from perturbative to non-perturbative regime: $0.1 < \chi < 3$ und $\xi \gtrsim 1/\sqrt{\chi}$
    - Follow-up (LUPE?): Experiment with plasma-mirrors (Wim et al.) in deeply non-linear regime ($\chi \gg 1$ und $\xi \gg 10$)
  - Discovery of Vacuum Magnetic Birefringence (VMB) at ALPS II (2026/2027)
    - 600x higher sensitivity than state of the art (PVLAS), complementary to HIBEF@Eu.XFEL
- **Gravitational waves**: a new window to the Universe
  - Strong synergy with astro physics and QU Exc. Cluster (scientifically and technically)
  - Exciting idea to search for high-frequency grav. Waves (early universe, e.g.. PBHs)
    - GW@ALPS, GW@BabyIAXO, levitated sensors, SRF
    - R&D needed / ongoing
  - Iinvolvement in Einstein Telescope unclear => need vision with the new DZA



Technical Manpower

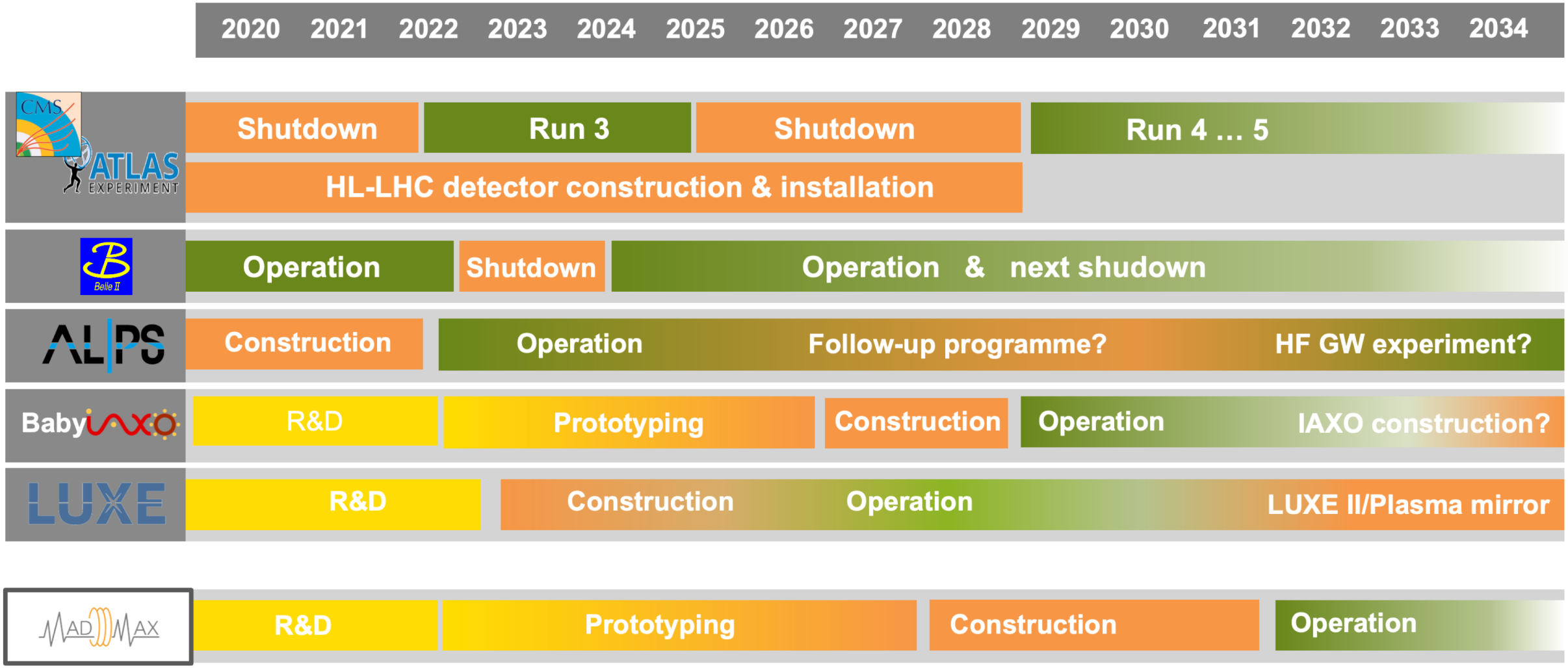


Typically 6-8 FTE per year for the on-site experiments

R. Jacobs

Timeline

Of particle physics ativities at DESY



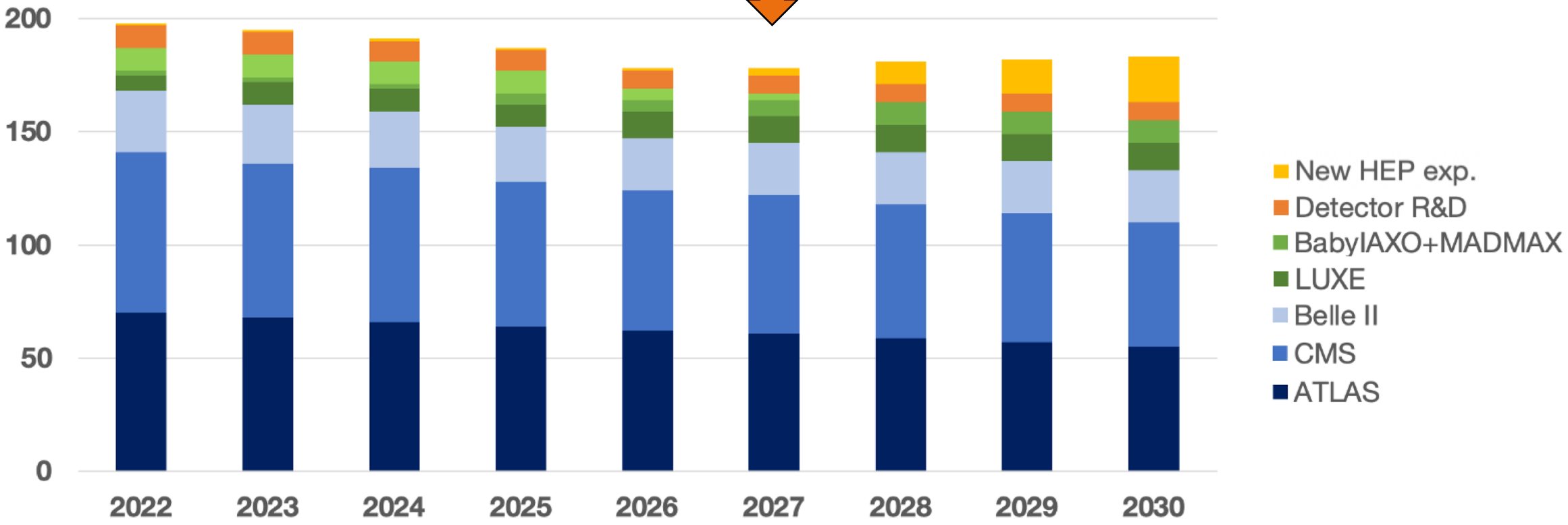
T. Schörner

FTEs as function of year

2022-2030

2027: Eur Particle Physics Strat. Update => Collider decision?

FTE per Experiment/Aktivität



Further Thoughts

Further thoughts

Education and mobile work

- **Student and postdoc education**
  - Need to encourage students to go to colloquia, seminars etc.
  - Maybe need a special lecture series on the ”big questions of HEP” to ensure students are prepared for PhD examinations and for postdoc applications?
  - Task force on student education and recruitment?
  - Postdoc mentoring programme? (for inside our field)
- **Presence on campus**
  - Starting January: at most 50% mobile work allowed
  - As general rule I propose 80% (exceptions possible but ≥4 days should be default)
  - Otherwise we should seriously explore rearrangement/reduction of office space

Further thoughts

Enhance interactions

- **Desirable to enhance communication between staff**
  - Particularly across the groups => horizontal groups, task forces, “tea time”, interaction spaces, …?
- **Could build up webpage that contains information and picture of all permanent scientists**
  - E.g. picture, group & activities involved, scientific & technical expertise/interests, other interests
  - Can be useful to find people with given expertise/interest
- **Ideally people should contribute to more than one FH activity**
  - E.g. intl. and local exp, task force, … => improves interactions and breadth
- **Tea and coffee breaks?**
  - Could propose regular tea and coffee ”times” where people get together at fixed locations
  - E.g. 10:30 and 15:00 30’ slots?

THANK YOU!!

- **Thank you for, depite the many challenges,**
  - Trying your best to achieve the goals but also adapting to schedules as needed
  - Staying positive and keeping a good spirit
- **I wish all of you a joyful and relaxing holiday season**
  - Please, get some strength back after such an exhausting year
- **And, I wish all of you and our World a happier, better and more peaceful year 2023!**

And my personal thanks to T. Behnke, K. Büsser, M. Fleischer, S. Krause, T. Schörner and A. Teufel