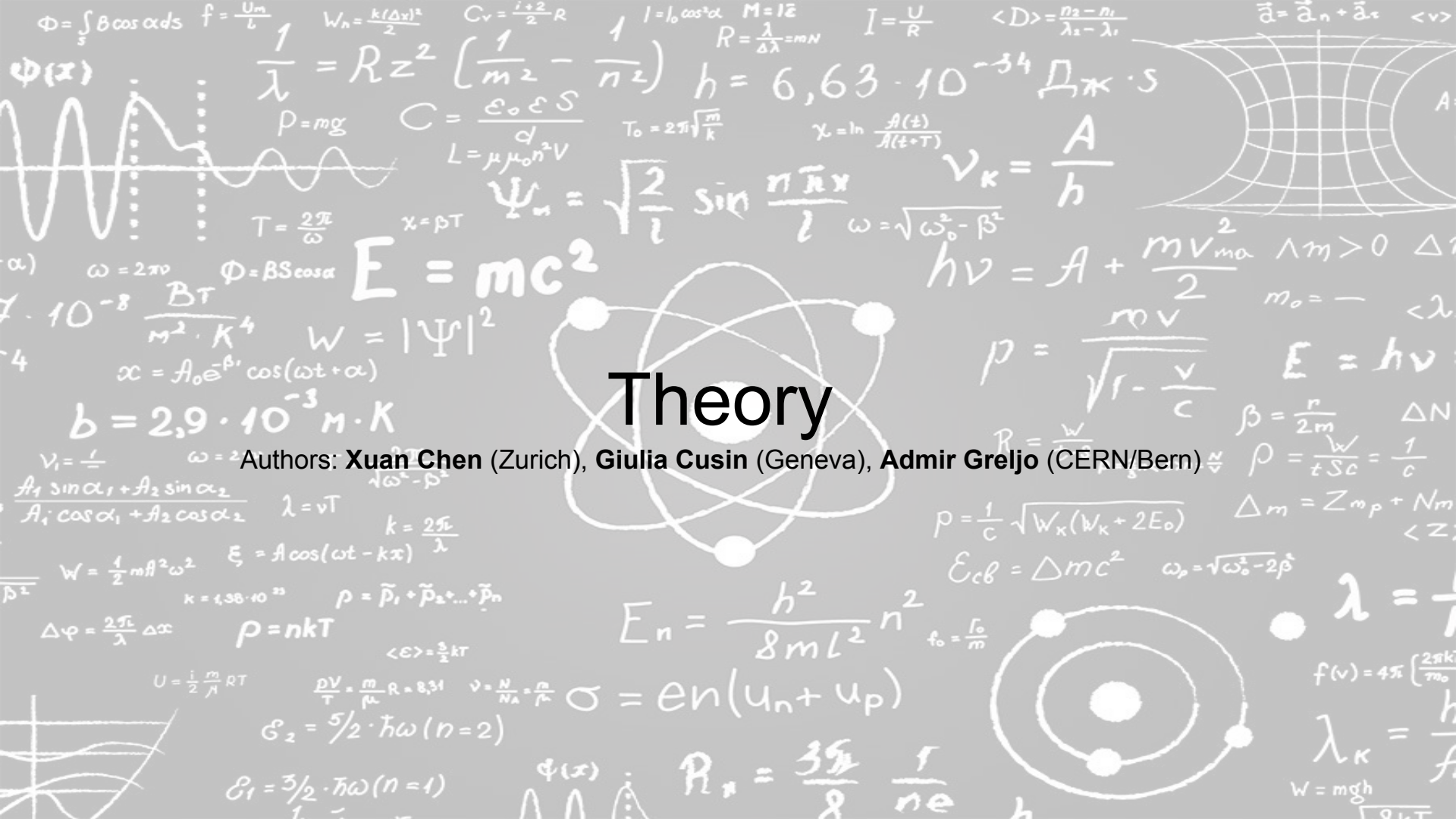


# CHIPP Roadmap Workshop 2020

## Young People Vision

# Theory

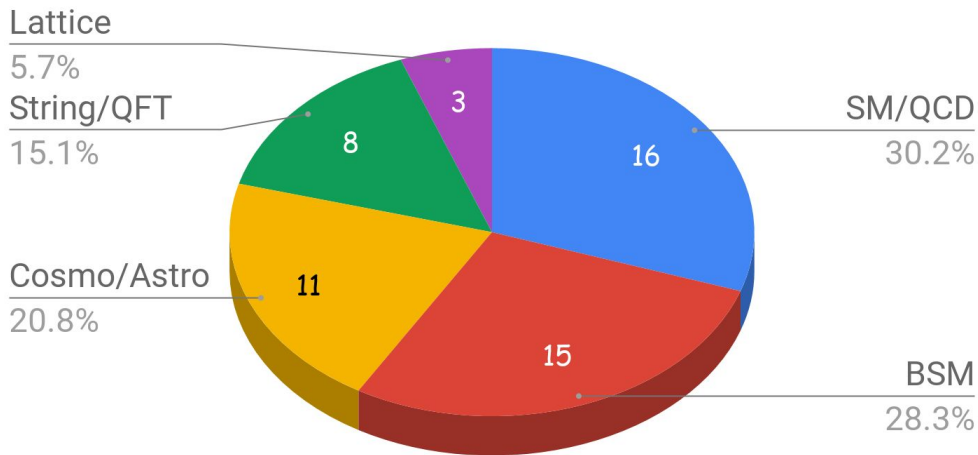
Authors: **Xuan Chen** (Zurich), **Giulia Cusin** (Geneva), **Admir Greljo** (CERN/Bern)



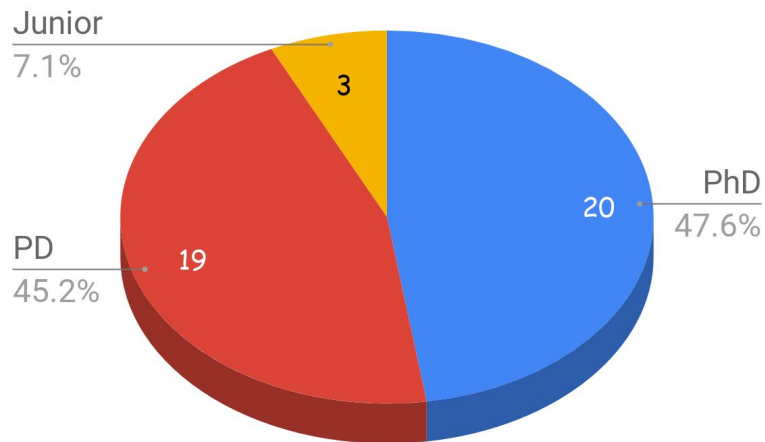
# Survey among young theorists in CH

- About 120 questionnaires sent to young theorists
- Research type: PhD students, Postdocs, Junior
- Swiss institutes: Basel, EPFL, ETH, Geneva, Zurich, Bern, PSI - uniform response

Response by subfield:

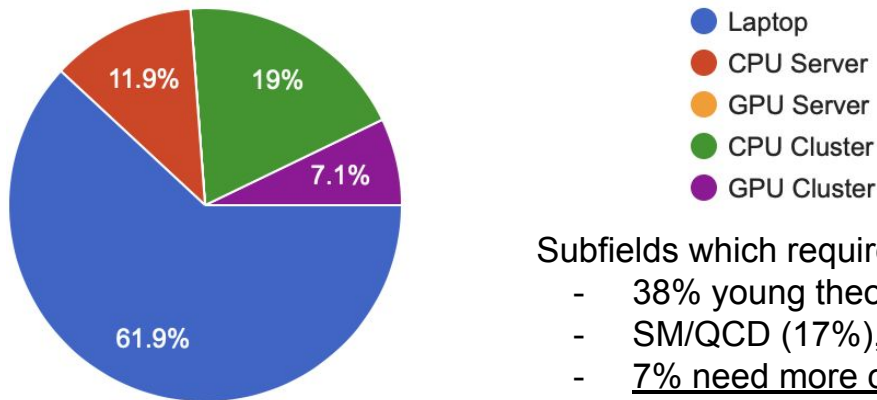


Research Type:



# Collaboration dynamics and resources

- 90% of publications are with  $< 6$  coauthors.
- Only 15% are members of big international collaborations.
- Majority of publications have at least  $\frac{1}{2}$  Swiss authors.
- $\frac{2}{3}$  think there are enough occasions to meet other Swiss theorists.
- Computing resource:



## Subfields which require intensive computing:

- 38% young theorists need external computing resources
- SM/QCD (17%), Cosmo/Astro (10%), BSM (7%), Lattice (5%)
- 7% need more computing resource (need 5k hours/month but only have 1k hours/month right now, need server level upgrade)
- Heavy computing users ( $>100k$  hours/month) all have access to CSCS

# The state of the research

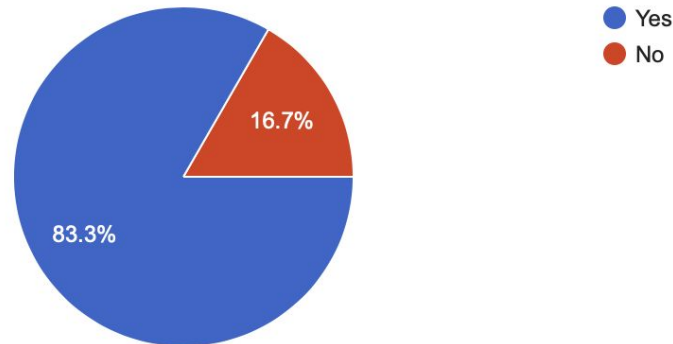
- **Major developments / breakthroughs:**  
Summary of the replies: SM precision calculations such as N3LO and muon  $g-2$ , Flavour model building, constraints on modified gravity, no major breakthrough

- **Main trends:**  
Precision calculations in QCD and flavour physics, EFT method in collider pheno and gravitational waves, flavour anomalies,  $H_0$  tension, origin of dark matter, neutrinos, quantum computing, machine learning, bootstrap method

- **Interplay with other fields:**  
Only  $\frac{1}{4}$  thinks there is a **synergy** with other fields. Those fields are: non-HEP physics & mathematics.

Do you think Switzerland is at the forefront of your subfield?

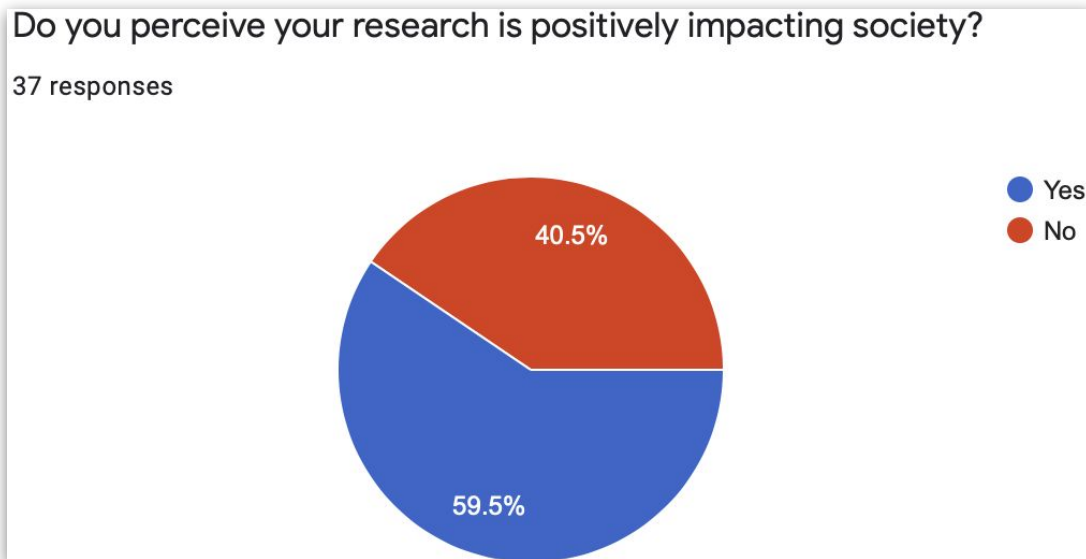
42 responses



- Only 17% involved in an **interdisciplinary** project.
- More than 40% think their research is benefiting from recent advancements in other fields.

# Outreach / Perception

- 56% of young theorists did not participate in any outreach event in the last 4 years.
- 78% would like to have more organised outreach activities.
- 41% do not think their research is positively impacting society (?!).



# Outlook for the future

How do you see HEP **evolving** globally in the next few years and more long term?

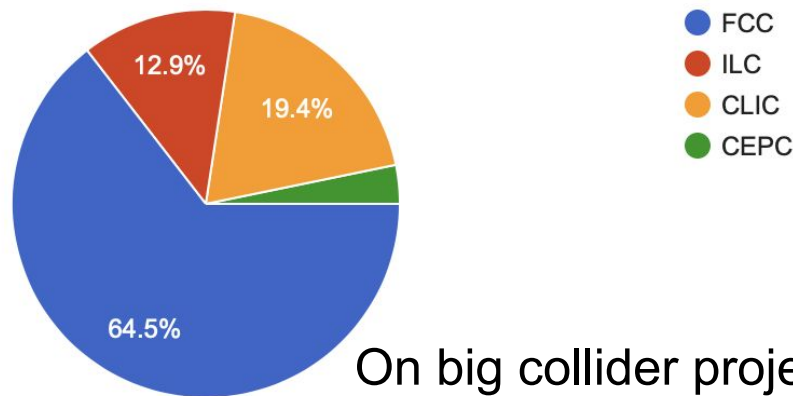
- Shift of directions. Migration from certain topics to others.
- 30% explicitly mention contraction.

“If there is no new collider, the field will be dead by 2050.”

“I think the expansion/contraction depends a lot on whether NP is actually found or not.”

Which one of the proposed big future collider projects do you think is a priority?

31 responses



On big collider projects

# Theory summary

- Switzerland is at the forefront of theoretical research.
- More and more diverse directions are trending / no clear single path forward.
- Overwhelming support for a strong experimental program / exploration needed.
- Some concerns about the overall perception of young theorists.