

# Hands-on & Minds-on Particle Physics in S'Cool LAB at CERN

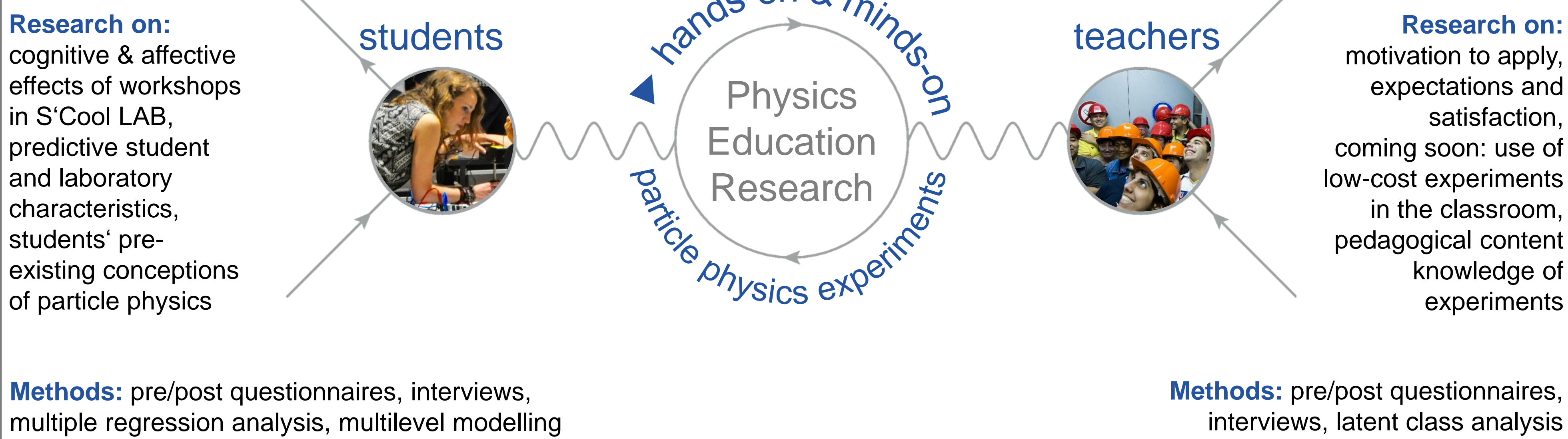
S'Cool  
LAB

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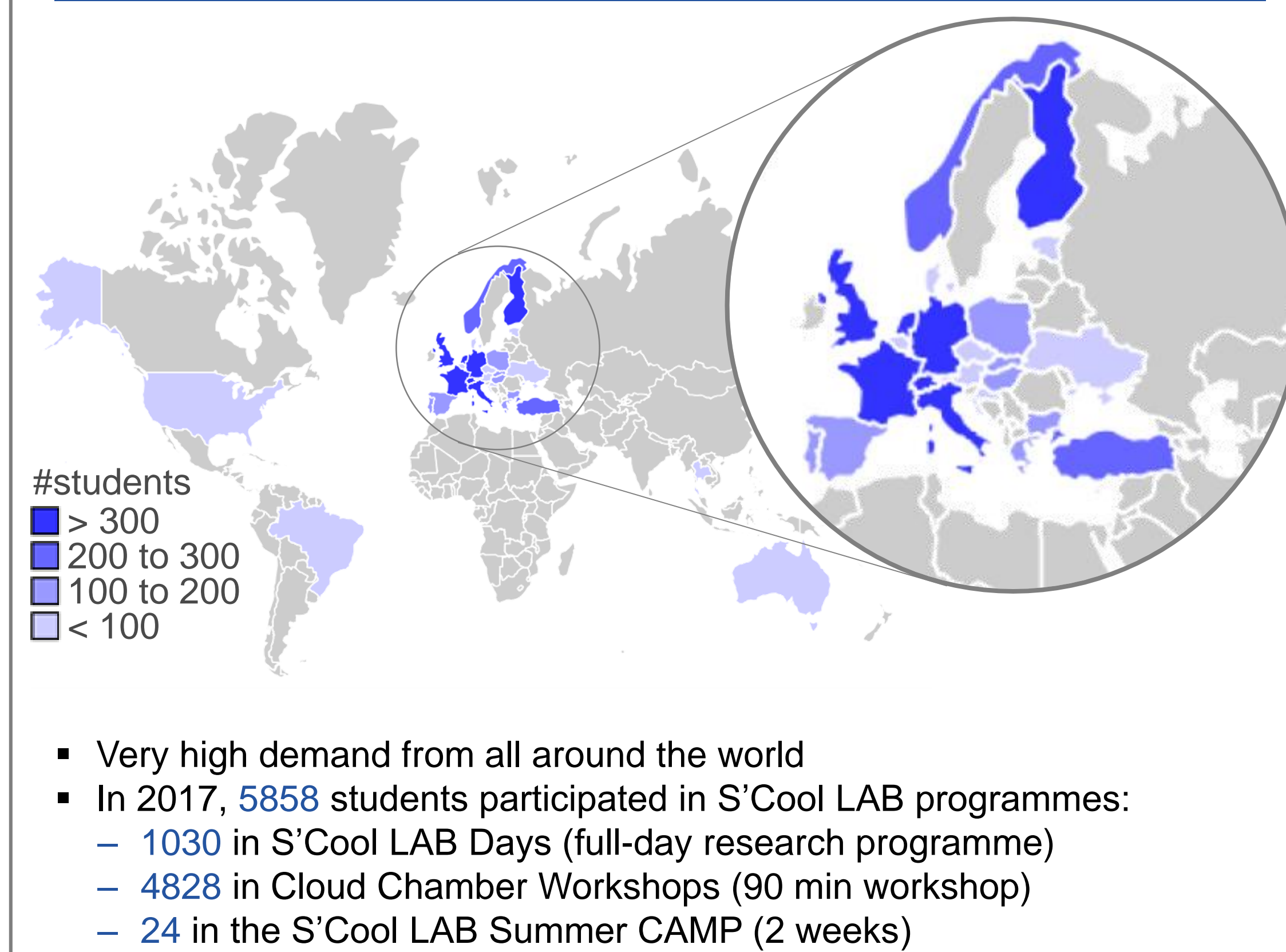
CERN, Geneva, Switzerland

## S'Cool LAB – a new Physics Education Research facility at CERN

S'Cool LAB is a new Physics Education Research facility at CERN, the world's largest particle physics laboratory in Geneva, Switzerland. High-school students and their teachers contribute to research projects by taking part in hands-on & minds-on particle physics experiments on-site at CERN.

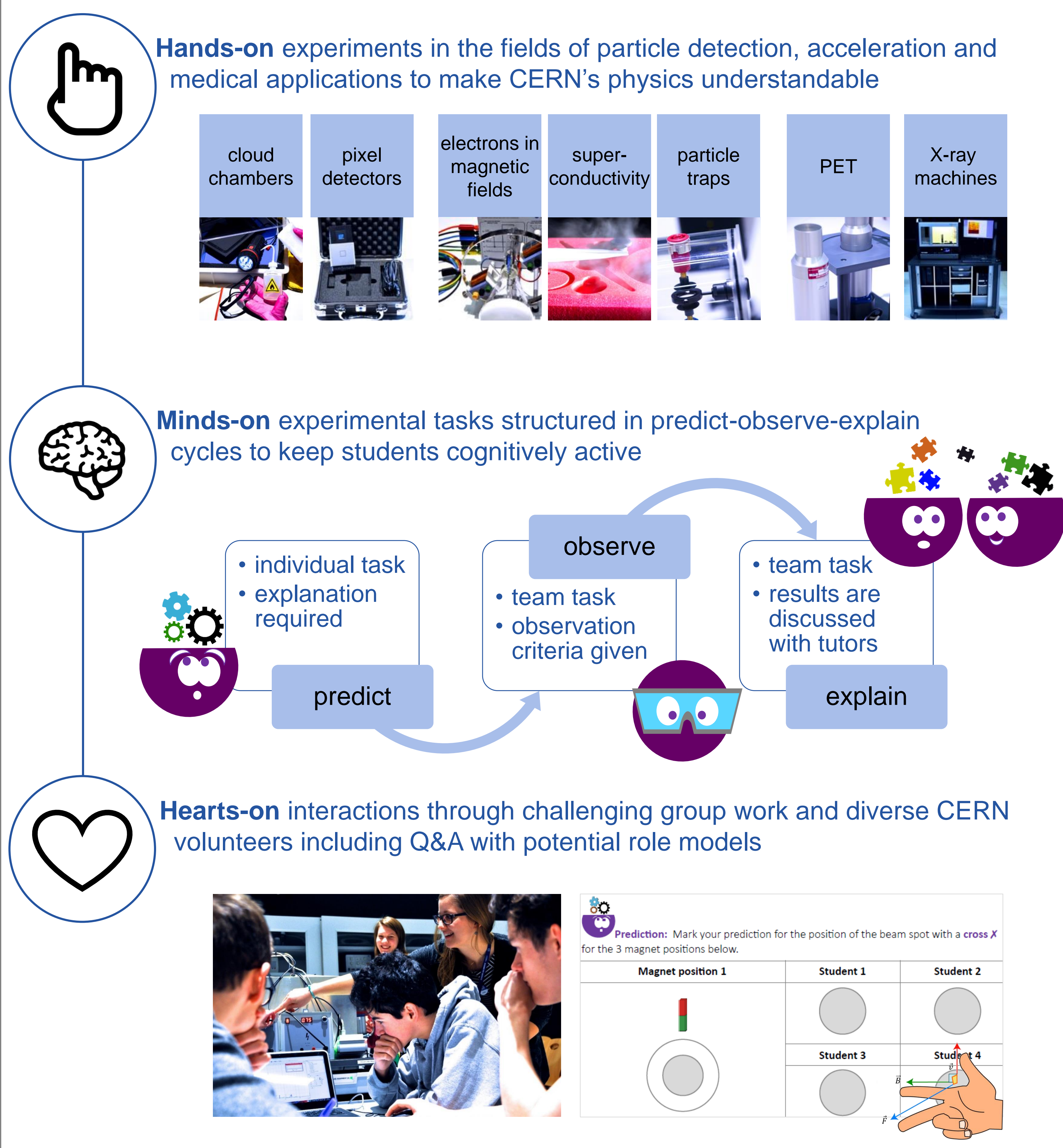


## Origin of Students in S'Cool LAB



## Learning Activities in S'Cool LAB

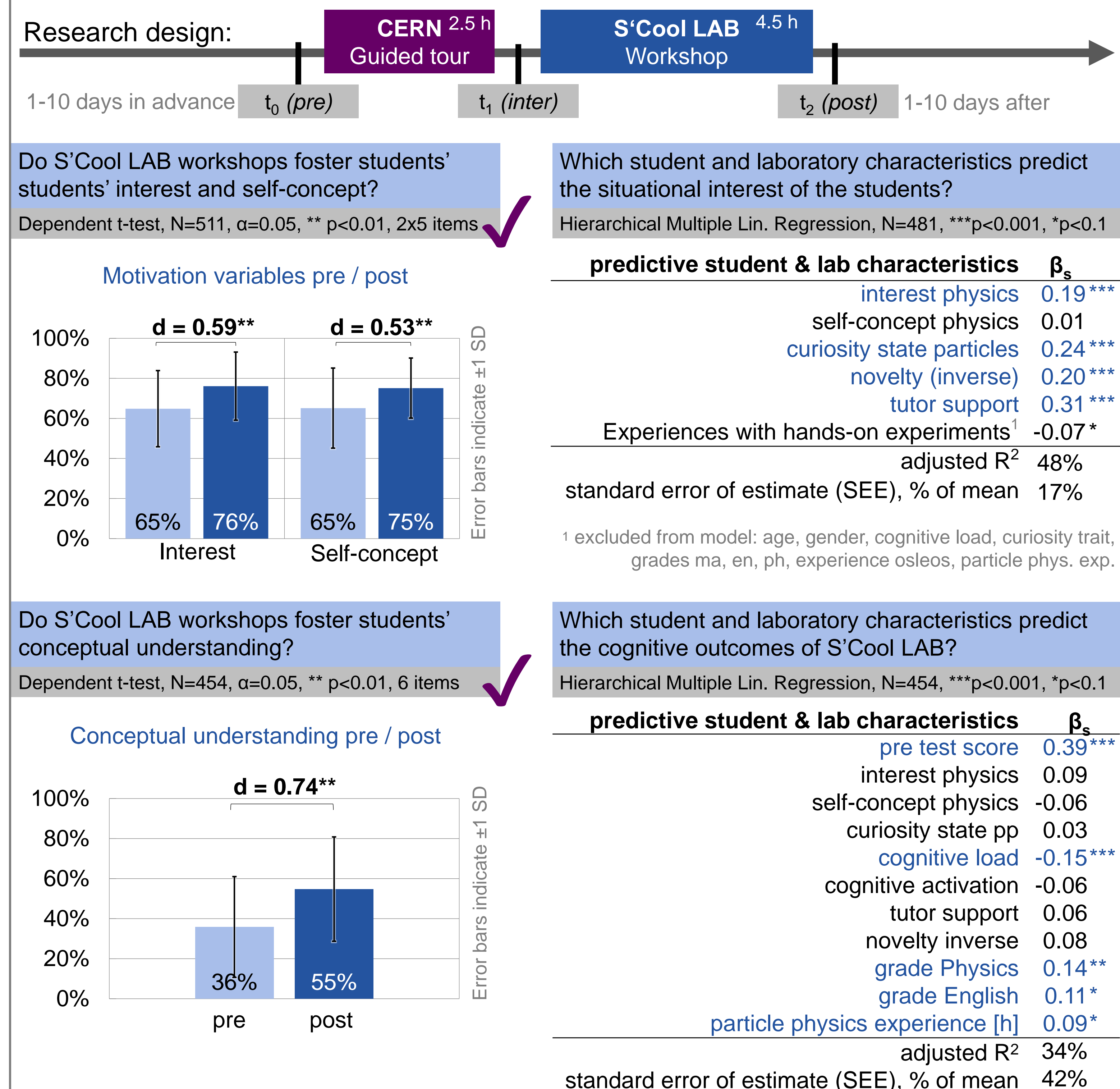
Learning activities in S'Cool LAB are based on known students' conceptions and include predict-observe-explain tasks (White & Gunstone, 1992) to foster conceptual change. They focus on affective & cognitive effects through learning with "hands, head, & heart" (Pestalozzi, 1826).



## Affective & Cognitive Effects of S'Cool LAB

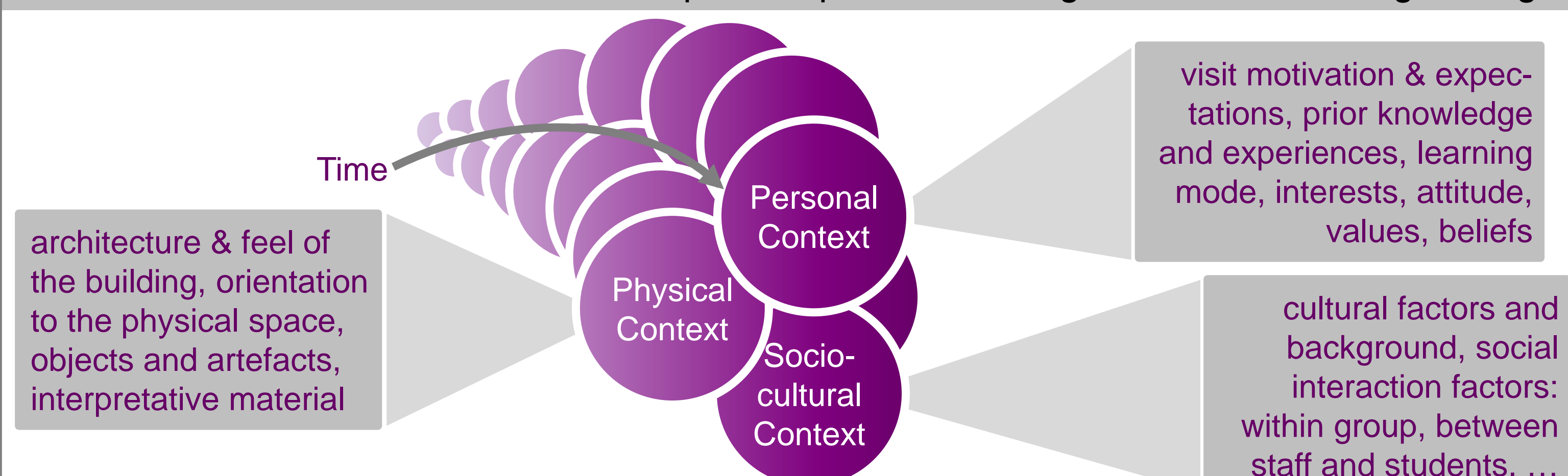
For the main study, students filled in questionnaires before and after their visit to CERN to assess their interest and self-concept in physics as well as the situational interest and self-concept in S'Cool LAB. In addition, relevant student and lab characteristics derived from Falk & Dierking's Contextual Model of Learning such as age, gender, prior experiences and grades, perceived cognitive load, tutor support, novelty, etc. were measured.

gender: 33% female, 67% male | average age: 17.0 years



## Falk and Dierking's Contextual Model of Learning

A theoretical framework to describe, explain or predict learning in informal learning settings



## Summary and Future Work

Participation in S'Cool LAB workshops leads to medium-sized cognitive and affective effects on high-school students, despite the relatively short intervention time. To maximise the effects of a visit to a hands-on learning lab like S'Cool LAB:

students (and their teachers) should	labs like S'Cool LAB should
<ul style="list-style-type: none"><li>- be interested &amp; curious about particle physics</li><li>- understand and speak English well enough</li><li>- come well prepared (organisation of the trip, information about the way of working and the underlying physics concepts)</li></ul>	<ul style="list-style-type: none"><li>- be well organised</li><li>- aim for the right level of cognitive load of the experimental tasks</li><li>- find and train fantastic tutors</li></ul>

Future research will focus more on the cognitive effects of S'Cool LAB including a more precise measurement through a higher number of standardized concept test items.

