

## **Empowering the engines of knowledge and creativity: Learning from experiments in theory and practice**

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Experiments play many different roles in research and education. The introductory part of my talk addresses the wide gap between the theoretical claims about their function in teaching and learning physics and the mixed outcomes of experimental work in daily practice. While experiments are often reduced to their formal role in the inquiry cycle to test hypotheses, they do have many productive functions which escape an easy formal description. Therefore, the practical part of the presentation substantiates the view of experiments as engines of knowing by providing examples for the constructive and creative interplay of theoretical and experience based knowledge. Simple, hands-on experiments can foster theoretical insight into complex processes that generate new entities. Thus, the experiments embody seemingly creative mechanisms in different domains and open up intriguing views on the universality of emergent processes in the physical and biological realm.