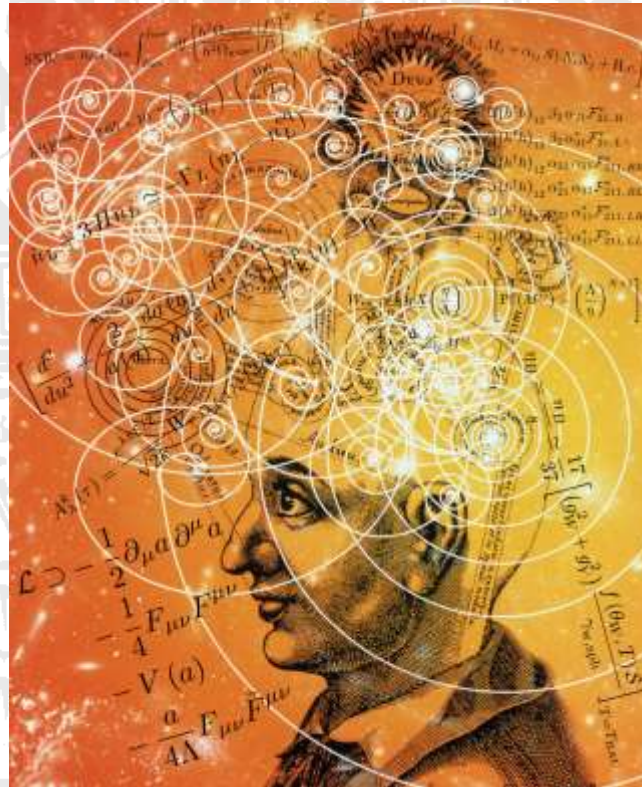




# SONDERKOLLOQUIUM

AM 24. JULI 2019 UM 9:00 UHR  
IM SEMINARRAUM, GUSTAV-MIE-GEBÄUDE



## Axion-Like Particles and Gravitational Waves New Opportunities for Particle Cosmology

DR. KAI SCHMITZ

UNIVERSITY OF PADUA, ITALY

"Stand in the middle and enjoy everything both ways!" This is how physics Nobel laureate Richard Feynman once described our position in this world in comparison to the enormity of the Universe and the tininess of subatomic particles. For me personally, this quote captures the fascination of particle cosmology, which strives for a better understanding of the early Universe based on the methods of particle physics---and which is the field of research that I work on.

In my talk, I will take the audience on a tour through this interdisciplinary and developing field. I will explain how axion-like particles, promising candidates for new physics beyond the Standard Model of particle physics, may have shaped the dynamics and properties of the early Universe; and I will discuss how we may be able to probe axion-like particles and other new-physics phenomena in the early Universe based on the observation of gravitational waves. Our tour will lead us far back in time: to the earliest moments when the Universe was expanding exponentially fast, to cosmological phase transitions that caused the state of the vacuum to change, and to the time of photon decoupling when the Universe sent us a baby picture at the age of roughly 380,000 years. But our tour will also lead us to Freiburg and Geneva in the year 2019 and beyond, where theoretical and experimental physicists are working on experiments such as the Large Hadron Collider (LHC) or the CERN Axion Solar Telescope (CAST) to solve the mysteries of the cosmos and the subatomic world. The essence of our wild trip through space and time will be that particle cosmology is an exciting field of research full of opportunities that await to be explored.