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The CERN CLOUD Experiment

Wednesday 27 November 2024 15:15 (25 minutes)

This talk will provide an overview of the CERN CLOUD experiment, which explores the formation of atmospheric aerosol particles from trace gas molecules, with a particular focus on the role of cosmic ray-generated ions. Atmospheric aerosols and their interactions with clouds are critical for regulating Earth's radiative balance, making this research essential for understanding anthropogenic climate change. Over more than a decade of operation, CLOUD has made substantial contributions to this field.

The centerpiece of the experiment is the CLOUD chamber, the world's cleanest facility for aerosol formation studies. This 27 m3 stainless steel chamber allows precise control of trace gases at parts-per-trillion levels and simulates a wide range of atmospheric conditions, operating between −70℃ and 100℃ with an accuracy of 0.1℃. Six different light sources are used to trigger various chemical reactions and cosmic rays are simulated using a pion beam from the Proton Synchrotron. The talk will cover the experimental setup, its unique capabilities, the scientific motivation behind the experiment, and key findings that enhance our understanding of atmospheric particle formation and its impact on the global climate.

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