



Physics Department seminar

DIPARTIMENTO DI FISICA, VIA CELORIA 16, MILANO

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**New particle formation around the globe:
From laboratory experiments
to the Everest Base Camp and further**

Atmospheric aerosols affect the climate directly by absorbing or scattering incoming radiation and also indirectly by acting as cloud condensation nuclei (CCN) changing therefore the cloud albedo. A major fraction of these CCN comes from gas to particle conversion (nucleation). During the last decade, several nucleation studies have been published based on field observations, however most of them were carried out in the planetary boundary layer. Therefore, only little information is available about the free troposphere. The aim of this presentation is to elucidate the last findings about what species contribute to new particle formation (NPF) in remote places, especially at high altitude.

In the last years, we have used state-of-the-art instruments, first at the Swiss high alpine research station Jungfraujoch (3580 m asl, Bianchi et al., 2016), at the Himalayan Nepal Climate Observatory Pyramid (NCO-P) site on the southern slope of the Himalayas, not far from Everest base camp (5079 m asl)(Bianchi et al., 2021) and finally at the Chacaltaya station in Bolivia (5420 m asl)(Bianchi et al., 2022). Previous studies have already shown that at all these locations NPF takes place frequently. However, no chemical information of the vapours was retrieved.

In this seminar, in addition to present the results of these studies, I will also compare them with laboratory experiments (i.e. CLOUD experiment at CERN). I will present a detailed analysis of the particle evolution during nucleation and the chemical composition of the small clusters measured with advanced mass spectrometers. I will also show that these processes are potentially very interesting to understand the aerosol conditions in the pre-industrial era for which information are really scarce. Finally, I will give some insights regarding present projects taking place in urban environments such as Beijing or Milano.

References

Bianchi, F., et al., (2016) Science 6289, 1109-1112.

Bianchi, F., et al., (2021) Nature Geoscience,
<https://doi.org/10.1038/s41561-020-00661-5>.

Bianchi, F., et al., (2022) BAMS, <https://doi.org/10.1175/BAMS-D-20-0187.1>.



Students are cordially invited – Contact silvia.leoni@mi.infn.it