universität innsbruck

Innsbruck Physics Colloquium

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Atmospheric new particle formation: from molecular clustering to global climate and air quality

The production of molecular clusters and their growth to larger sizes, is a world-wide phenomenon, with a significant contribution to aerosol particle number load and indirect radiative effects as well as urban air pollution. Understanding the very initial steps of atmospheric aerosol formation requires detailed knowledge of interlinked physics and chemistry in sub 3 nm size range. To understand these processes proper instrumentation is needed like the PTR-MS-Family developed based on prof. Armin Hansel's insightful investigations.

There is always more or less intensive clustering in the atmosphere but only some fraction of those clusters are able to growth to 3-5 nm and further to cloud condensation nuclei and haze particle sizes. Atmospheric new particle formation (NPF), together with secondary formation of particulate matter (secondary aerosol formation), modify the number concentration, size distribution, chemical composition and mass loading of atmospheric aerosol particle populations. Anyhow, NPF is a major aerosol source affecting significantly to global aerosol and CCN load as well as global climate and regional/local air quality.

In the presentation I will focus on:

- Environmental grand challenges
  - Climate change
  - Air quality
- Continuous, comprehensive observations, SMEAR stations
  - COBACC (COntinental Biosphere-Aerosol-Cloud-Climate) feedback loop
- Gas-to-Particle conversion / New particle formation (NPF)
  - CLOUD experiments
  - New instrumentation
  - Quantum chemistry
- The contribution of NPF on
  - Haze formation
  - Global and regional aerosol load – climate and air quality effects

On the occasion of Armin Hansel's 60th birthday

Tuesday, 31.01.2023, at 17:15 h, HS C (Technik)

Innsbruck Physics Colloquium,
Organisation: M. Beyer, K. Erath-Dulitz, H.-C. Nägerl, A. Reimer, T. Schrabback