Großes Physikalisches Kolloquium an der Universität zu Köln

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19.06.2018
16[45] Uhr / HS III

Air pollution from plants: Application of laser induced fluorescence methods to assess the budget of radicals in atmospheric simulation experiments

The formation of air pollutants such as ozone and particles is the result of the oxidation of emissions of organic and inorganic compounds. The majority of organic compounds are released by vegetation. Therefore, it is critical to understand the oxidation processes for accurate predictions of air pollution. Oxidation reactions are initiated by photochemically formed hydroxyl radicals (OH). Due to their short chemical lifetime and therefore small concentration in the atmosphere, highly precise instrumentation is required for their detection. This can be achieved by resonant laser-induced fluorescence at the OH absorption line at 308nm. The ns-laser pulse with a narrow bandwidth is produced by a custom-built dye laser system. OH concentration measurements together with the measurement of chemical lifetime of OH ("OH reactivity") allow quantification of the total turnover of OH that is equivalent to the rate with which secondary pollutants from the oxidation reaction are formed. The presentation will discuss the measurement techniques and their application in simulation experiments investigating the most important organic compounds from trees in the large (270m3) outdoor chamber at Forschungszentrum Jülich.