



Berliner Physikalisches Kolloquium

im Magnus-Haus, Am Kupfergraben 7, 10117 Berlin

Eine gemeinsame Veranstaltung der Physikalischen Gesellschaft zu Berlin e.V.,
der Freien Universität Berlin, der Humboldt-Universität zu Berlin,
der Technischen Universität Berlin und der Universität Potsdam
– gefördert durch die Wilhelm und Else Heraeus-Stiftung –

Am Donnerstag, dem **10. Januar 2019**, um **18:30 Uhr**

spricht

Prof. Dr. Jean-Pierre Wolf
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über das Thema

„Controlling atmospheric processes with high-intensity laser filaments“

Moderation: Ludger Wöste, Freie Universität Berlin

Ultra-intense laser filaments have recently demonstrated their potential for modulating atmospheric processes [1]. Four characteristic examples are highlighted in this presentation: lightning control, laser-induced water vapor condensation, transmission of optical data through fog, and modulation of the radiative forcing properties of cirrus clouds. For instance, field experiments in various atmospheric conditions showed that laser filaments induce water vapor condensation and fast droplet growth up to several μm as soon as the relative humidity exceeds 70%. This effect mainly relies on photochemical mechanisms allowing efficient binary condensation and ultrafast oxidation of existing organic particles. Conversely, clearing fogs and clouds is efficiently achieved by using ultrashort, high-intensity lasers with high average powers ($>100\text{ W}$, $> \text{kHz}$). Instead of evaporating the droplets, the mechanism relies on shock waves induced by the filaments that mechanically expel the droplets from the beam in a quasi-continuous way. The applications of such fog and cloud clearing are of paramount importance for recent programs on laser-based earth-to-satellite classical or quantum communications.

[1] J. P. Wolf, *Short Pulse Lasers for Weather Control*, Rep. Prog. Phys. **81**, 026001 (2018).