Presstime Bulletin

'Light Filaments' Burst Through Fog

The absorption and scattering of infrared radiation by water droplets is a serious issue for applications such as free-space optical communications and lidar-based ranging and atmospheric sensing. The findings of a group at **Universit Claude Bernard Lyon 1** in Villeurbanne, France, suggest that the use of intense, ultrashort laser pulses that produce "light filaments" can compensate for these effects and can enable the transmission of photonic signals through media with the optical thickness of dense clouds.

In the work, which appeared in the July 14 issue of *Applied Physics Letters*, scientists at the university's Laboratoire de Spectrométrie Ionique et Moléculaire investigated the interaction of 150-µm-diameter, 3-m-long light filaments produced with 120-fs, 7-mJ pulses of 810-nm laser radiation with water and ink droplets. Light filaments are stable structures that form by Kerr self-focusing and plasma defocusing as a laser beam modifies the index of refraction of the transmission medium.

They discovered that interaction with a 50-µm-diameter droplet resulted in an energy loss of only approximately 40 µJ and that the filaments were nearly unaffected by interactions with 95-µm-diameter droplets of water or ink. Moreover, the filaments passed unscathed through a 0.35-m-long cloud chamber with an optical thickness as high as 3.2, corresponding to that of a cumulus or stratocumulus cloud, they reported.