Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Fine structure of the vapor field in evaporating dense sprays EMMANUEL VILLERMAUX, ALEXANDRE MOUTTE, MURIEL AMIELH, PATRICE MEUNIER, Aix Marseille Université, CNRS, Centrale Marseille, IRPHE UMR 7342, 13384 Marseille, France — Making use of an original technique which permits the simultaneous measurement of both the displacement field of evaporating droplets in a spray, and of their vapor, we investigate the relevance of a scenario introduced earlier to describe the evaporation dynamics of dense sprays [*Phys. Rev. Fluids* 1, 014201 (2016)]. A plume of dense acetone droplets evaporating in air is studied, for which the stirring field is measured by particle image velocimetry of the droplets, and the vapor field is imaged quantitatively by laser-induced fluorescence. We show, thanks to these unique in situ measurements, that the spray boundary with the diluting environment is slaved to the dynamics of its saturating vapor concentration field, whose structure is analyzed for different well defined local flow topologies.

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Date submitted: 31 Jul 2017 Electronic form version 1.4