Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Drops on elastic tracks CAMILLE DUPRAT, Princeton University, SUZIE PROTIERE, CNRS/IJLRA-Universite Paris 6, ALEXANDER BEEBE, HOWARD STONE, Princeton University — Fibrous media are ubiquitous functional materials, which often consist of flexible high aspect ratio fibers that can easily deform under capillary forces with many industrial and ecological consequences. We study the influence of a mist of droplets on an elastic array of fibers by considering a finite volume drop on a pair of two flexible fibers, clamped at one end and free to deflect at the other. The elastocapillary deformation of the fibers leads to the spontaneous motion of the drop toward the free ends. The drop either remains compact with minimal spreading or spreads into a long liquid column that coalesces the fibers. We find that there is a critical volume of liquid, hence a critical drop size, above which this coalescence does not occur, and we identify another drop size which maximizes spreading, thus liquid capture. Experimental results and mathematical models will be presented and compared. These ideas are applicable to a wide range of fibrous materials, as we illustrate with quantitative examples for feathers, beetle tarsi, sprays and microfabricated systems.

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Date submitted: 04 Aug 2011 Electronic form version 1.4