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When Marangoni meets Savart: The distant interaction of a drop with a liquid sheet BAPTISTE NÉEL, EMMANUEL VILLERMAUX, Aix-Marseille University — The interaction of a radially expanding water sheet (Savart) with an ethanol droplet evaporating at a short distance from it is investigated. The millimetric pendant droplet is positioned a few millimeters above a horizontal sheet, whose thickness is typically a few tens of microns. Although the droplet and the sheet are not in contact, the sheet radius is abruptly reduced downstream of the drop. We infer that the introduction of a few molecules of ethanol vapor emanating from the drop into the water sheet decreases its thickness, via a localized surface tension deficit. The corresponding Marangoni stresses induce a flow which progressively digs the sheet, hastening its rupture. A quantitative mechanism is proposed to represent all these observations, whose relevance to the puzzling problem of thin films (in the micron range) stability is underlined.

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