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Condensing drops on soft substrates

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The behaviour of drops on rigid and liquid substrates has been investigated extensively in the past and is well understood. However, soft substrates have gained increasing attention recently, since these exhibit elastic properties and can be deformed by liquid on a scale of the elastocapillary length. Soft wetting problems give rise to a wide variety of phenomena that are currently being investigated in many different ways. In this talk we present three such approaches to study condensation on soft solids. Condensation experiments of drops on substrates of different softness has resulted in distinctive breath figures / drop ensembles that indicate softness dependent nucleation probabilities. To better understand these results we employ a simple gradient dynamics model and show that it qualitatively captures the former results. Finally, we used finite element simulations to ensure proper treatment of elasticity and thoroughly investigate the statics of a single drop, particularly focusing on the Shuttleworth effect, i.e. the strain dependence of the solid surface energy.

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