

MPIDS Colloquium



MAX-PLANCK-GESELLSCHAFT

Rayleigh vs Marangoni

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In this talk I will show several examples of an interesting and surprising competition between buoyancy and Marangoni forces.

First, I will introduce the audience to the jumping oil droplet – and its sudden death – in a density stratified liquid consisting of water in the bottom and ethanol in the top: After sinking for about a minute, before reaching the equilibrium the droplet suddenly jumps up thanks to the Marangoni forces. This phenomenon repeats about 30-50 times, before the droplet falls dead all the sudden. We explain this phenomenon and explore the phase space where it occurs.

Next, I will focus on the evaporation of multicomponent droplets, for which the richness of phenomena keeps surprising us. I will show and explain several of such phenomena, namely evaporation-triggered segregation thanks to either weak solutal Marangoni flow or thanks to gravitational effects. The dominance of the latter implies that sessile droplets and pending droplets show very different evaporation behavior, even for Bond number $\ll 1$. I will also explain the full phase diagram in the Marangoni number vs Rayleigh number phase space, and show where Rayleigh convections rolls prevail, where Marangoni convection rolls prevail, and where they compete.

The research work shown in this talks combines experiments, numerical simulations, and theory. It has been done by and in collaboration with Yanshen Li, Yaxing Li, and Christian Diddens, and many others.

Wednesday, March 4th, 2020 at 2:15 pm

**MPIDS, Prandtl Lecture Hall,
Am Faßberg 11, Göttingen**

**Max Planck Institute for Dynamics and Self-Organization
Theory of Turbulent Convection
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