



# "Soft-Matter Seminar"

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## Title:

## "Impact on Liquids: Void Collapse and Jet Formation"

## Abstract:

A spectacular example of free surface flow is the impact of a solid object on a liquid surface: At impact a splash is created and a surface cavity (void) emerges which then collapses creating an upwards and downwards jet at the pinch-off singularity and entraining a giant bubble. In our experiment the impact of a circular disc with constant velocity is analyzed using high-speed imaging at up to 50,000 frames per second. Numerical simulations are conducted with a computationally very efficient boundary-integral method which allows accurate tracking of the highly unsteady gas-liquid interface. Combining in this way experiment, theory and numerical simulations the talk will focus on two aspects of this very rich process:

1) After cavity closure the pinch-off location turns into a stagnation point surrounded by a locally hyperbolic flow pattern. This flow was thought to be at the origin of the high-speed jet. We show in the present work, however, that the pinch-off singularity alone is not sufficient to explain jet formation. Instead, only the inertial focussing of the liquid colliding along the entire wall of the cavity provides enough energy to eject the observed high-speed jets. The liquid contained in the jet is shown to originate exclusively from a thin layer straddling the surface of the original collapsing bubble.

2) Substituting the disc by an elongated cylinder shows that the geometry of the impacting object can create parasitic capillary waves which lead to unexpected discontinuities of the cavity closure depth as a function of the impact velocity.

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**14:45 Uhr**

**Raum PH 3024**

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