Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

How a laser impact fragments a liquid drop HANNEKE GELDERBLOM, ALEXANDER L. KLEIN, Physics of Fluids, Faculty of Science & Technology, University of Twente, The Netherlands, HENRI LHUISSIER, IUSTI, Aix-Marseille Université, France, DETLEF LOHSE, Physics of Fluids, Faculty of Science & Technology, University of Twente, The Netherlands, EMMANUEL VILLERMAUX, IRPHE, Aix-Marseille Université, France — The deposition of laser energy in a superficial layer of an unconfined liquid drop leads to propulsion, strong deformation of the drop into a thin sheet, and eventually fragmentation. Here we study the mechanisms leading to drop fragmentation by combining high-speed and stroboscopic imaging with analytical modelling. We investigate how ligaments and holes develop on the deforming drop, which eventually cause the drop to break up, and identify the dependence of this fragmentation process on the laser-pulse properties. We demonstrate that a Rayleigh-Taylor instability of the decelerating sheet rim leads to the formation of radial ligaments. The holes nucleating in the sheet result from a subtle interaction between the kinematic amplification of initial disturbances in the laser-beam profile and an intrinsic Rayleigh-Taylor instability caused by the rapid forward acceleration of the drop.

Hanneke Gelderblom
Physics of Fluids, University of Twente

Date submitted: 29 Jul 2016 Electronic form version 1.4