Liquid drops on soft solids LUUK A. LUBBERS, JOOST H. WEIJS,
University of Twente, SIDDHARTHA DAS, University of Alberta, LORENZO
BOTTO, Imperial College, BRUNO ANDREOTTI, University Paris-Diderot,
JACCO H. SNOEIJER, University of Twente — A sessile drop can elastically deform
a substrate by the action of capillary forces. The typical size of the deformation is
given by the ratio of surface tension and the elastic modulus, γ/E, which can reach
up to 10-100 microns for soft elastomers. In this talk we theoretically show that the
contact angles of drops on such a surface exhibit two transitions when increasing
γ/E: (i) the microsocopic geometry of the contact line first develops a Neumann-
like cusp when γ/E is of the order of few nanometers, (ii) the macroscopic angle
of the drop is altered only when γ/E reaches the size of the drop. Using the same
framework we then show that two neighboring drops exhibit an effective interac-
tion, mediated by the deformation of the elastic medium. This is in analogy to the
well-known Cheerios effect, where small particles at a liquid interface attract each
other due to the meniscus deformations. Here we reveal the nature of drop-drop
interactions on a soft substrate by combining numerical and analytical calculations.

Luuk Lubbers
University of Twente