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Capillary Interactions among Spherical Particles at a Curved Liquid Interface CHUAN ZENG, University of Massachusetts Amherst, FABIAN BRAU, Physique Theorique, Universite de Mons, BENNY DAVIDOVITCH, ANTHONY D. DINSMORE, University of Massachusetts Amherst — Colloidal particles tend to adsorb on liquid interfaces, where in- plane interactions can arise from a variety of mechanisms. We focus on capillary interactions induced by the curvature of the liquid interface, where particles were assumed to have a constant Young-Laplace contact angle at the three-phase contact line. Whereas spherical particles can adsorb on flat or spherical interfaces without deforming the interface, adsorption on a cylindrical interface deforms the interface because of the lack of azimuthal symmetry around the contact line. We present an analytical model of the interfacial shape and energy upon adsorption of a single particle as well as the interaction between two particles. Based on our result on a cylindrical interface, we propose a general formula for the force on a particle on a curved interface. This study provides an important step toward understanding the interactions among interfacial particles when the interface is distorted by an external field. We acknowledge support from the NSF-supported MRSEC on Polymers at UMass (DMR- 0820506) and NSF CBET-0967620.

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