# Colloidal "Hard Spheres" at an Oil/Water Interface

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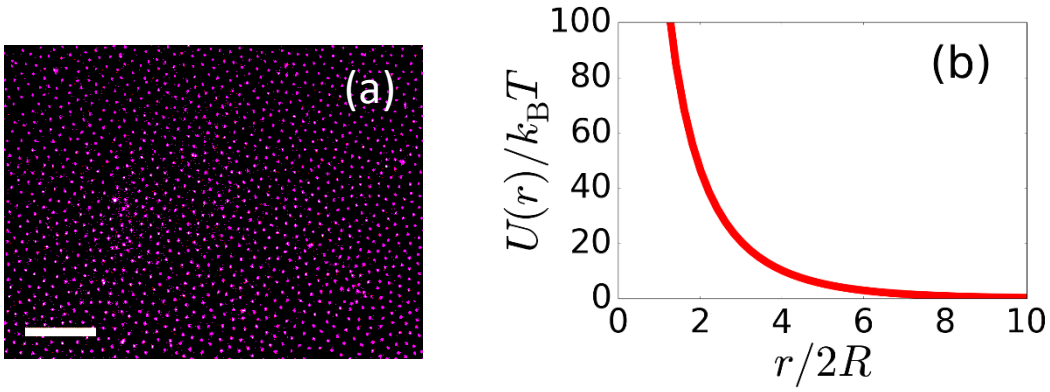
Interfaces occur almost everywhere in both industry and nature. They can be simple interfaces, such as between water and air, where the interfacial tension is enough to describe them. On the other hand, they can be complex interfaces, such as those found in emulsions in foods [1], which require more complex treatments to describe. Despite their complexity, these interfaces are of great interest due to their presence in various areas: foodstuffs, cosmetics, paints and even biological cells.

The complexity of these interfaces can arise because of solid particles adsorbed to the interface. These are used to stabilise interface dominated materials, such as emulsions, against coalescence, allowing for a remarkably long life time. An important aspect of these systems that is currently not understood is the structure and interaction of particles adsorbed to the interface.

Here, we measure this structure and interaction in two ways. We report on the radial distribution function of poly(methyl methacrylate) particles adsorbed to a water/dodecane interface. We then use a reverse Monte Carlo scheme to find the pair potential between the adsorbed particles. In doing this, we find a negligible dipole contribution to the pair potential suggesting that previous models [2, 3] do not apply to our system. We propose a new model that considers the particles as neutral holes in the charged plane of the liquid-liquid interface. Through a series of tests, including varying salt concentration and use of an optical trap, we have verified this model.




*(a) Experimental snapshot of particles at an interface, scale bar is* 100 *µm. (b) Parameterised U(r) using appropriate input parameters for input to Monte Carlo simulations.*

[1] E. Dickinson, *Food Hydrocolloids*, **17**, pp. 25-39 (2003).
[2] R. Averyard *et al*., *PRL*, **88**, 2461021 (2002).
[3] K. Masschaele *et al*., *PRL*, **105**, 048303 (2010).