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Collective effects in the flotation of electrically charged particles at an interface DUCK-GYU LEE, Department of Nature-Inspired Nanoconvergence Systems, Korea Institute of Machinery and Materials, PIETRO CICTUA, Cavendish Laboratory, University of Cambridge, Cambridge CB3 0HE, United Kingdom, DOMINIC VELLA, Mathematical Institute, University of Oxford, Oxford OX2 GG, United Kingdom — We study the flotation of electrically charged line particles at a liquid-gas interface. Motivated by recent experiments on the anomalous attraction of charged and magnetic particles at interfaces, we consider the equilibrium of the particles, accounting for the weight of each as well as the electrical and surface tension forces acting on them. Our numerical solution of the force balance equations shows that as the number of particles increases, the particles sink deeper into the liquid and ultimately sink. To understand whether the clumps of particles that are formed are stable, we use a free energy analysis; this shows that as the number of particles N increases, the binding energy *per particle* increases also. We compare our numerical results with scaling and experimental analyses.

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