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**Modulation of attractive colloidal interactions by lipid and protein membrane functionalization** YUPENG KONG, RAGHUVEER PARTHASARATHY, Univ. of Oregon, Dept. of Physics — The broad technological and scientific importance of colloidal materials has spurred a large body of research into the functionalization of micron-scale particles. Progress towards self-assembled microparticle superstructures remains slow, however, and fundamental mysteries such as the attractions observed between like-charged particles near a confining wall remain unresolved. These difficulties arise in large part due to the lack of experimental systems with tunable, attractive interparticle interactions. Biomembranes are appealing candidates for colloidal functionalization, enabling access to electrostatic and chemical properties that influence inter-particle relations. We describe here the first measurements of the pair interaction energy for membrane-functionalized colloids, using a newly developed optical line trapping technique. Two classes of particles, derivatized with lipid-only and lipid-plus-protein membranes, each show attractive interactions. The two particle types exhibit different relations between the depth and spatial range of the interactions, however. Control of lipid composition allows the first reported decomposition of like-charge interactions into charge-dependent and -independent terms, leading to a striking insight into the long-standing paradox of like-charge attraction: the charge-dependent term in the interaction is purely repulsive, while the attraction is independent of particle charge.

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