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Collective self-propulsion in active and passive apolar coloidal mixtures IGNACIO PAGONABARRAGA, Ecole Polytechnique Federale de Lausanne — Collections of interacting active particles, self-propelling or not, show remarkable phenomena including the emergence of dynamic patterns across different length scales, from animal groups to vibrated grains, microtubules, bacteria, and chemical or field-driven colloids. Artificial active particles convert energy from the environment into net propulsion, breaking detailed balance and even action-reaction law in different many particle systems, a clear signatures of their out-of-equilibrium nature. I will analyze the emerging properties in systems composed by passive and active apolar colloids. The colloidal activity induces activated chemophoretic flows which lead to effective attractive interaction even for systems in which isolated active colloids are apolar. These dynamic interactions lead to collective emergent motion and can promote the formation of a rich variety of self-assembled structures. I will discuss how a combination of a passive cargo and apolar active colloid can form to self-propelling hybrid clusters and will show how increasing the size of the attached non-catalytic cargo, the cluster can reverse its direction, thus providing a general description of how activity and propulsion emerge in a catalytic active and passive mixed system.

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