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Casimir Effect and Fluctuation-Induced Attractive Forces in Active Matter CYNTHIA REICHHARDT, LENA LOPATINA, CHARLES REICHHARDT, Los Alamos National Laboratory — We consider the fluctuation-induced forces between plates in walls immersed in a bath of active matter, similar to the forces in the classical Casimir effect. The active matter could represent swimming bacteria. We find that the active matter causes a strong attractive force between two plates, whereas for strictly Brownian particles, there is little effect or no attraction between the plates. We discuss how the motion of the active particles, the breaking of detailed balance by the walls, and the geometry of the sample leads to a reduced particle density between the plates and produces a density-induced pressure on the plates. This result also indicates that for movable objects immersed in an active matter bath, larger objects will aggregate over time, suggesting that active matter could be used as the catalyst for a novel self-assembly method. Finally, we discuss other geometries that can produce a repulsive force between the walls, as well as the effect of flocking particles.

Cynthia Reichhardt
Los Alamos National Laboratory

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