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**Non-equilibrium depletion interactions: dual-probe microrheology** ROSEANNA ZIA, JOHN BRADY, California Institute of Technology — Non-equilibrium depletion interactions in colloidal dispersions are studied via nonlinear, dual-probe microrheology, theoretically and via Brownian dynamics simulation. We study the interactive force between a pair of probe particles translating with equal velocity through a colloidal dispersion with their line of centers transverse to the external forcing. The character of the microstructure surrounding the probes is determined by the distance $R$ by which the two probes are separated and by the strength of the external forcing compared to the thermal force of the bath, which defines a Péclet number, $Pe = Ua/D_b$, where $U$ is the probe velocity, $a$ is its size and $D_b$ the diffusivity of the bath particles. Osmotic pressure gradients develop as the microstructure is deformed, giving rise to an interactive force between the probes. This force is studied for a range of $Pe$ and $R$. For all separations $R > 2a$, the probes attract when $Pe$ is small. As the strength of the forcing increases, a qualitative change in the interactive force occurs: the probes repel each other. The separation $R$ at which the attraction-to-repulsion transition occurs decreases as $Pe$ increases as the entropic depletion attraction becomes weak compared to the force-induced osmotic repulsion.

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