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Experimental signature of the self-caging in quiescent colloidal glasses MINH TRIET DANG, SANNE LOENEN, Institute of Physics, University of Amsterdam, KATHARINE JENSEN, School of Engineering and Applied Science, Yale University, ROJMAN ZARGAR, DANIEL BONN, PETER SCHALL, Institute of Physics, University of Amsterdam — Glasses have liquid-like structure, but solid-like properties. Here, we use colloidal glasses to directly visualize particle configurations in glasses and supercooled liquids. In hard-sphere systems, the particle configurations provide a unique route to the free energy of the system, determined by geometry only. We determine the free volumes of the particles, and directly relate to their free energy changes. We observe two different length scales of free volume distribution in space and a long-range correlation of local free energy of colloidal glasses. This is the first experimental signature self-caging of colloidal glasses, which indicates the first-order phase transition in glasses.

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