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Geometrical Mechanism for Solid-Fluid transition in a Granular system ROHIT INGALE, MARK SHATTUCK, Levich Institute, CCNY — We report an experimental investigation of the geometrical mechanism for solid-fluid transition in a quasi-two dimensional granular system. We demonstrate the presence of geometrical structures resembling plane tilings composed of squares and equilateral triangles in our quasi-2D granular fluid. We further show that this tiling structure manifests itself in distinct features in the bond-length and bond-angle distribution functions. These experimental observations coupled with a number of previously reported theoretical and simulation studies strongly support the proposed square-triangle tiling mechanism for 2D melting. These findings present a possible way to explain the observed phase transitions in non-equilibrium granular systems using entropic-like arguments similar to those used for equilibrium hard sphere/disk systems.

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