Rigidity for sticky disks

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This talk is about two related questions:

(1) If P is a packing of n disks in the Euclidean plane with generic radii, what can the contact graph of P be?

(2) If (G,p) is a (necessarily non-generic) framework in the Euclidean plane arising from the contact graph of a packing of n disks with generic radii, and G has 2n - 3 edges, is (G, p) infinitesimally rigid?

The answer to (1) is that G must be (2,3)-sparse and that the answer to (2) is “yes”, giving a Laman-type result for “sticky” disk packings. The proof ideas connect to Cauchy’s rigidity theorem on polyhedra and let us obtain a non-periodic variant of Connelly’s “Isostatic Theorem” on jammed packings.

This is joint work with Bob Connelly and Shlomo Gortler.