The classic energy minimization problem asks which configuration(s) of N points on the 2-sphere minimize the total potential energy when it is computed with respect to a power law potential. When N=2,3,4,6,12 the answer the obvious one (e.g. a regular tetrahedron or octahedron). I'll explain work I did for the case N=5, which proves that the best configuration is a triangular bi-pyramid when the power law potential is less than about 15.05, and then the answer switches to some pyramid with square base. This "phase transition" had been noticed experimentally in the late 70s.

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