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Artistic Patterns from the Universe Projected onto the Unit Sphere.

A central premise of the field of cosmic crystallography is the idea of the universe being finite yet unbounded, such as a 3-torus or similar construction with rotated or reflected gluing of the faces of the torus. After presenting these ideas in my Mathematics for Space Applications course, students wondered what percentage of the sky we would need to search to guarantee seeing a replication of ourselves, or our galaxy supercluster. In pursuing answers to this question, we explore projections of lattice points, or shifted lattice points, onto the unit sphere and the resulting Delaunay triangulations, which give rise to beautiful patterns as well as provide insights about the nature of possible shapes of space. (Received September 25, 2018)