Recent aspects of sphere packings - Part II
(Org: **Karoly Bezdek** (University of Calgary, Canada) and/et **Oleg Musin** (The University of Texas Rio Grande Valley, USA))

KAROLY BEZDEK, University of Calgary, Canada
Bounds for contact numbers of locally separable unit sphere packings

The contact number of a sphere packing is the number of touching pairs of balls in the packing. A packing of balls in Euclidean d-space is called totally separable if any two balls can be separated by a hyperplane such that it is disjoint from the interior of each ball in the packing. We call a packing of balls locally separable if each ball of the packing together with the balls that are tangent to it form a totally separable packing. We prove bounds for the contact numbers of locally separable packings of n unit balls in Euclidean d-space.

ROBERT CONNELLY, Cornell University, Ithaca, NY, USA
Flipping and flowing

The well-known Koebe–Andreev–Thurston circle packing theorem states that for every planar graph G with n vertices, there is a corresponding packing of n disks in the plane, whose contact graph is isomorphic to G. Moreover, if G has all its faces triangles, then this packing is unique up to Möbius transformations and reflections. The idea is to take a given triangulated packing, move the whole packing removing one contact, while, at the end, creating another contact, keeping the whole collection a packing in between. This is an idea going back to László Fejes Tóth. (Joint work with Steven Gortler.)

THOMAS FERNIQUE, University of Paris 13, Paris, France
Maximally dense sphere packings

It is well known that to cover the greatest proportion of the Euclidean plane with identical disks, we have to center these disks in a triangular grid. This problem can be generalized in two directions: in higher dimensions or with different sizes of disks. The first direction has been the most studied (for example, in dimension 3, the Kepler's conjecture was proved by Hales and Ferguson in 1998). In this talk, we will rather focus on the second direction, in particular on the cases of two or three disc sizes. We will survey recent results for a large audience.

DUSTIN G. MIXON, The Ohio State University, Columbus, USA
Uniquely optimal codes of low complexity are symmetric

Consider the problem of arranging a given number of points in a compact metric space so that the minimum distance is maximized. Strikingly, solutions to this coding problem often exhibit some degree of symmetry. In this talk, we introduce a large family of spaces in which optimality implies symmetry, and we pose various open problems. Joint work with Chris Cox, Emily King, and Hans Parshall.

PHILIPPE MOUSTROU, UiT – The Arctic University of Norway, Norway
Coloring the Voronoi cell of a lattice

We define the chromatic number of a lattice as the least number of colors one needs to color the interiors of the cells of the Voronoi tessellation of a lattice so that no two cells sharing a facet receive the same color. In this talk we give a brief overview of the techniques that can be applied to obtain bounds on the chromatic number of a lattice, with a special focus on the connections with sphere packings. This is a joint work with Mathieu Dutour Sikirić, David Madore, and Frank Vallentin.