The geometry research at the Institute of Mathematics and Physics of the University of Science and Technology in Bydgoszcz dates since over 40 years. For over 20 last years two main streams (see below) of our research concern packing/covering problems and reduced bodies. Both the topics belong to the field of convex geometry. We are providing also mathematical research on other subjects. Here are present members of our **research geometry group** (formally, BS-40/2015): Paulina Grzegorek, Janusz Januszewski, Marek Lassak, Michał Musielak, Monika Nowicka, Alfred Witkowski, Łukasz Zielonka.

Research on packing and covering problems

Recall that this field was initiated by the classical Problem 10.1 by Auerbach, Banach, Mazur and Ulam put into the famous *Scottish Book* in the 1930s. This problem concerns packing sequences of convex bodies into a convex body of the Euclidean d-space E^d.

Here are directions of our research from this packing/covering stream.

- Searching the upper bounds of the total volume of convex bodies (in particular, boxes or cubes) that can be packed into a convex body (in particular, into a box or a cube) of E^d.
- Estimating the lower bounds of the total volume of convex bodies (in particular, boxes or cubes) that permit a covering of a convex body (in particular, a box or a cube) of E^d.
- Creating and studying online algorithms for packing items into bins, and providing a more general task in E^d.
- Examining the asymptotic competitive ratio for packing algorithms with finite number of active bins.

Our research articles on this subject in recent years:

P. Grzegorek and J. Januszewski, Online algorithms for 3-space bounded 2-dimensional bin packing and square packing, Romanian J. Inf. Sci. Tech. **17** (2014), 190–203.

P. Grzegorek and J. Januszewski, A note on one-space bounded square packing, Inform. Process. Lett. **115** (2015) 872–876.

J. Januszewski, Covering the plane with translates of a triangle, Discrete Comput. Geom. **43** (2010), 167–178.

J. Januszewski, Translative packing of a square with sequences of squares, Colloq. Math. **121** (2010), 273–280.

J. Januszewski, Packing rectangles into a large square, Period. Math. Hungar. **72** (2016), 90–101.

J. Januszewski and Ł. Zielonka, Improved online algorithms for 2-space bounded 2-dimensional bin packing, Internat. J. Found. Comp. Sci. **27** (2016), 407–429.

M. Lassak, H. Martini and M. Spirova, On translative coverings of convex bodies, Rocky Mountain J. of Math. **44** (2014), 1281–1299.

Ł. Zielonka, On-line packing cubes into n unit cubes, Bulletin Polish Acad. Sci. Math. **64** (2016), 185–198.

Research on reduced convex bodies

A convex body C is called *reduced* provided the thickness (called also *minimum width*) of every convex body contained in C is smaller than the thickness of C. This definition given by Heil in 1978 evoked about 50 research papers by a number of authors.

Our research on this subject concerns
- reduced bodies in the Euclidean d-dimensional space,
- reduced bodies in the finite-dimensional Banach space,
- reduced bodies on the d-dimensional sphere.

Our research articles on this subject in recent years:

M. Lassak, Approximation of convex bodies of constant width and reduced bodies in a normed plane, J. Convex Anal. **19** (2012), 865–874.

M. Lassak, Width of spherical convex bodies, Aequationes Math. **89** (2015), 555–567.

M. Lassak, Reduced spherical polygons, Colloq. Math. **138** (2015), 205–216.

M. Lassak and H. Martini, Reduced convex bodies in Euclidean space - a survey, Expo. Math. **29** (2011), 204–219.

M. Lassak and H. Martini, Reduced convex bodies in finite-dimensional normed spaces, Results Math., **66** (2014), 405–426.

M. Lassak and M. Musielak, Reduced spherical convex bodies (to appear), arXiv:1607.00132.