

ANNOUNCEMENT

Vortragsankündigung

Mittwoch, 11. Dezember 2024, 11.15 Uhr im SR I

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“Natural tilings: from hard rock to soft cells”

Space-filling natural patterns are not only fascinating but often they are a unique source of information on shape evolution, both in geology and biology. In this talk I visit two remarkable examples.

While the shape of fractured rocks appears, at first sight, to be a collection of random polyhedra, through the lens of the theory of convex mosaics a different picture emerges: it turns out that large ensembles of natural fragments carry, *on average*, the combinatorial properties of the cube which, according to Plato, is the building block of the element Earth.

While polyhedral tilings serve as excellent models of natural patterns ranging from fractured rock to supramolecular ensembles, biological evolution often selects shapes with curved contours and few, if any, sharp corners.

The geometrical theory of such *soft cells*, filling space without gaps, overlaps and sharp corners turns out to be not only an interesting mathematical subject but also helps to explain such iconic natural shapes as the chamber of the nautilus shell.

Related links:

<https://www.pnas.org/doi/full/10.1073/pnas.2001037117>

<https://www.quantamagazine.org/scientists-uncover-the-universal-geometry-of-geology-20201119/>

<https://www.pnas.org/doi/10.1073/pnas.2300049120>

<https://www.quantamagazine.org/the-simple-geometry-that-predicts-molecular-mosaics-20230621/>

<https://academic.oup.com/pnasnexus/article/3/9/pgae311/7754698>

<https://www.nature.com/articles/d41586-024-03099-6>

<https://mailchi.mp/fields.utoronto.ca/events-at-fields-oct4-oct17-18865839-19117232>

<https://www.smithsonianmag.com/smart-news/mathematicians-discover-a-new-class-of-shape-the-soft-cell-180985124/>