An Invitation to Tropical Alexandrov Curvature

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Alexandrov curvature, a generalization of classical Riemannian sectional curvature, is determined by comparison of triangles in an arbitrary metric space to corresponding triangles in Euclidean space. We study Alexandrov curvature in the tropical projective torus with respect to the tropical metric, which has been useful in various statistical analyses, particularly in phylogenomics. We find that positive, negative, zero, and undefined Alexandrov curvature can exist concurrently in the tropical setting, and that there is a tight connection between triangle combinatorial type and curvature. Our results are aided by computational experiments, and shed light on the intricate geometry of the tropical projective torus.

Joint work with Anthea Monod (Imperial College London).