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Connections between Čech complexes and the Carathéodory orbitope.

Čech and Vietoris–Rips simplicial complexes are ways to “thicken” a metric space. For example, a Čech complex is the nerve complex of all metric balls of a fixed radius. I will describe how the Čech complexes of the circle (which obtain the homotopy types of the circle, the 3-sphere, the 5-sphere, ... as the radius increases) are related to cyclic polytopes and to the Carathéodory orbitope (the convex hull of the trigonometric moment curve). However, many questions remain open. There are similar connections between the Vietoris–Rips complexes of the circle and the Barvinok–Novik orbitope, where even more questions remain. (Received February 17, 2018)