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Unknotting numbers and invariants of trivalent spatial graphs

The unknotting number of a knot is a topological invariant that is notoriously difficult to calculate. Unknotting numbers of knots, links, and theta curves (a type of spatial trivalent planar graph) is externally motivated by modeling problems arising in molecular biology. Generalizing the theorem of Scharlemann that unknotting number one knots are prime, we prove that if a composite theta-curve has unknotting number one, then it is the order 2 sum of an unknotting number one knot and a trivial theta-curve. We also will discuss some recent results in which we bound the unknotting numbers of spatial trivalent planar graphs by their signature and a certain slice orbifold Euler characteristic. This reports on works joint with Baker, Buck, O'Donnol and Taylor.