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**EZRA MILLER**, Duke University

*Homological algebra over partially ordered real vector spaces*

Using persistent homology to model shapes of embedded planar graphs composed of fruit fly wing veins requires homological algebra for modules over partially ordered real vector spaces. Basic finiteness assumptions for usual commutative algebra and relative homological algebra are too restrictive for persistence in this continuous multiparameter setting. This talk outlines a suitable alternative finiteness condition that robustly encodes topological tameness – which can reasonably be assumed to occur in persistence modules arising from data – in equivalent combinatorial, algebraic, and homological ways, notably including finiteness of homological dimension in a relative homological sense. The motivations and definitions will be explained from scratch, ending with a comparison to ordinary homological dimension over real-exponent polynomial rings.