Varieties of apolar subschemes of toric surfaces

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The variety of sums of powers associated to a homogeneous polynomial describes the additive decompositions of the polynomial into powers of linear forms. These polynomial decompositions appear in several areas such as representation theory, coding theory, signal processing, data analysis, and algebraic statistics.

One of the most useful tools to study varieties of sums of powers is apolarity. This notion is originally related to the action of differential operators on the polynomial ring. It can be generalized in terms of the Cox ring of a variety, and in this way varieties of sum of powers are a special case of varieties of apolar schemes. In this talk I will present this generalization and examples of such varieties in the case of toric surfaces, when the Cox ring is particularly well-behaved.

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