A characterization of sets of uniqueness

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A finite set of points in three dimensional space is called a set of uniqueness if it is completely determined by the cardinalities of its slices orthogonal to the coordinate axes.

It is in general a difficult problem to decide whether a set is a set of uniqueness. Fishburn, Lagarias, Reeds and Shepp gave a characterization of sets of uniqueness by the absence of certain configurations. However their characterization is hard to apply to particular examples.

In this talk we consider the problem from an algebraic point of view and give a characterization of uniqueness in terms of partitions on an integer, the dominance order defined on partitions, and matrices with integer coefficients. Our characterization is also hard to apply as it stands, but leaves a door open for future development.