1120-14-78   **David Cook**, **Brian Harbourne** and **Juan Migliore*** (`migliore.1@nd.edu`), Department of Mathematics, University of Notre Dame, Notre Dame, IN 46556, and **Uwe Nagel**. *Line arrangements and configurations of points with an unusual geometric property.*

I will give part 2 of a joint talk with Brian Harbourne. We discuss parts of a paper, arXiv:1602.02300, written jointly also with D. Cook and U. Nagel. The well-known SHGH conjecture proposes a solution to the question of how many conditions a general union of fat points imposes on the complete linear system of plane curves of fixed degree d. We propose a new problem, namely to understand the number of conditions imposed by a general union of fat points on the incomplete linear system defined by the condition of passing through a finite set of points, Z (not general). Clearly the geometry of Z has to play a role, but how it manifests itself is slowly emerging. We give a careful analysis of the first interesting case, namely that of just one fat point, having multiplicity $d-1$. After studying the geometry inherent in those Z which admit unexpected curves (i.e. those Z for which a naive dimension count doe not correctly predict the number of conditions imposed on the linear system), we relate our results to properties of the arrangement of lines dual to Z, using work of Di Gennaro-Ilardi-Valles and Faenzi-Valles. We also relate our results to a certain Lefschetz property, leading to a connection to Terao's conjecture on the freeness of line arrangements. (Received February 12, 2016)

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