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Giuseppe Favacchio, Elena Guardo, Brian Harbourne and Juan Migliore*
(migliore.1@nd.edu). *Unexpected hypersurfaces and when to expect them.*

I will talk about work of: Favacchio-Guardo-Harbourne-M, Harbourne-M-Nagel-Teitler and Chiantini-M. If X is a reduced subscheme in \mathbb{P}^3 , we say X admits an unexpected hypersurface of degree t and multiplicity m if passing through a general point P with multiplicity m fails to impose the expected number of conditions on hypersurfaces of degree t containing X . (This extends to \mathbb{P}^n .) We give geometric and algebraic properties of X that guarantee that X admits certain kinds of unexpectedness, or that X admits no unexpectedness. E.g., if X is a general complete intersection curve in \mathbb{P}^3 of type (a, b) , $2 < a \leq b$, then it admits an unexpected hypersurface of degree $t = (a - 1)(b - 1) + 1$ and multiplicity $m = (a - 1)(b - 1)$. But if X is degenerate then it admits no unexpected hypersurfaces. To measure unexpectedness we introduce the AV-sequences, which produce intriguing numerical information. We study what effect, if any, the Hilbert function of X has on whether or not X admits unexpected hypersurfaces, and we introduce the use of generic initial ideals to this problem. We give a surprising application, namely the study of sets of points in \mathbb{P}^3 whose general projection to \mathbb{P}^2 is a complete intersection. (Received February 06, 2021)