Algebraic Approaches to Colored Gaussian Graphical Models

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In these last two decades algebraic geometry is offering a novel approach to advancing problems on Gaussian models. This is done by identifying each Gaussian distribution with a symmetric matrix and analyzing the polynomials vanishing on these matrices. The set of such polynomials gives the vanishing ideal of the model. I will discuss symmetries in the coloring of a graph that facilitate computing these polynomials with an emphasis on toric vanishing ideals. The talk is based on the article https://epubs.siam.org/doi/abs/10.1137/21M1466943 with Coons, Misra and Sorea, and the preprint https://arxiv.org/abs/2309.10741 with Pal.