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*Geometric Representation of Graphs and Its Application to the Complexity of the Closest Pair Problem*

Every graph  $G$  can be represented by a collection of equi-radius spheres in a  $d$ -dimensional metric  $\Delta$  such that there is an edge  $uv$  in  $G$  if and only if the spheres corresponding to  $u$  and  $v$  intersect. The smallest integer  $d$  such that  $G$  can be represented by a collection of spheres (all of the same radius) in  $\Delta$  is called the sphericity of  $G$ , and if the collection of spheres are non-overlapping, then the value  $d$  is called the contact-dimension of  $G$ . In this talk, we present lower and upper bounds on the sphericity and contact dimensions of a complete bipartite graph  $K_{n,n}$  in various  $L^p$  metrics, and we show their connections to the complexity of the closest pair problem.