The kissing and other problems in distance geometry

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007 Kemeny Hall, 4:00 pm
(Tea 3:30 pm 300 Kemeny Hall)

Abstract

The kissing number k(n) is the maximal number of equal nonoverlapping spheres in n-dimensional space that can touch another sphere of the same size. This problem in dimension three was the subject of a famous discussion between Isaac Newton and David Gregory in 1694. In three dimensions the problem was finally solved only in 1953 by Schütte and van der Waerden. It was proved that the bounds given by Delsarte's method are not good enough to solve the problem in 4-dimensional space. Delsarte's linear programming method is widely used in coding theory. In this talk we will discuss a solution of the kissing problem in four dimensions which is based on an extension of the Delsarte method. This extension also yields a new proof of k(3)¡13. We are also going to discuss our recent solution of the strong thirteen spheres problem (Tammes' problem for n=13).

This talk should be accessible to undergraduates.