Seminar on Combinatorial Computing
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Room 6417, Graduate Center
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Conflict-free colorings

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Abstract

Suppose that a mobile telephone company has some *transmitters* interconnected by a fixed backbone network. Each transmitter could use only one frequency. Each *client* continuously scans frequencies in search for good reception. A reception in a given frequency is good if there is *exactly one* transmitter within its (circular) range with the given frequency. The company wants to provide good reception at any location, for mobile phones of any sensitivity, and wants to minimize the number of different frequencies used by the transmitters.

The corresponding mathematical problem is the following: Given a set P of n points in the plane, what is the smallest number of colors in a coloring of the elements of P with the property that any closed disk D with $D \cap P \neq \emptyset$ has an element whose color is not assigned to any other element of $D \cap P$. We refer to such a coloring as a *conflict-free* coloring of P with respect to disks. Even, Lotker, Ron, and Smorodinsky proved that any set of n points has a conflict-free coloring with $O(\log n)$ colors. On the other hand, Pach and Tóth proved that *any* set of n points needs $\Omega(\log n)$ colors for a conflict-free coloring. We present both arguments.

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or visit our website: http://math.gc.cuny.edu/Seminars/Combinatorics.html