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X-Raying 3-Dimensional Convex Bodies with Mirror Symmetry.

Let K be a d-dimensional convex body. A point p on the boundary of K is said to be X-rayed along a line with direction vector $\mathbf{v}$ if the line through p with direction $\mathbf{v}$ intersects the interior of K. A collection of lines is said to X-ray K if every boundary point of K is X-rayed along one of the lines. The minimum number of lines required to X-ray K is called the X-ray number of K, and is denoted by $X(K)$. In 1994, Bezdek and Zamfirescu conjectured that $X(K) \leq 3 \cdot 2^{d-2}$ for any d-dimensional convex body K.

In this talk, we explain how the X-ray Conjecture is related to the famous Gohberg-Markus-Hadwiger Covering Conjecture. Then we verify the X-ray conjecture for planar convex bodies, showing that three lines are needed if, and only if, the convex body is a triangle. Finally, we prove that any 3-dimensional convex body exhibiting mirror symmetry also satisfies the X-ray Conjecture. (Received September 16, 2014)