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Seeing the Light: Connecting Conic Section Representations Using Flashlights and Parametric Functions.

Common Core State Standards Initiative calls for geometry students to translate between geometric descriptions of conics and the equations describing them. For example, students should derive the equations of an ellipse or hyperbola given the foci (CCSS 2012). In this talk, we will explore pedagogical tools for inciting investigations into understanding conic sections by asking how students could make connections between the different descriptions of conics. Specifically, we will review an undergraduate research project undertaken which sought to answer the question of how the foci are related to the intersecting cone and plane, which employed the "rotating flashlight" visualization in a mathematical form. This led to generating a map $C : [0, 2\pi) \rightarrow \mathbb{R}^2$ which defined the set of all conic sections in terms of the parameters associated with the intersecting cone and plane, and provided a derivation for the explicit relationship between these descriptions. We will then discuss how one may generalize this pedagogical technique to other research endeavors. (Received September 19, 2016)