



**SOCIETY of  
PHYSICS STUDENTS**



# **“Leonardo’s cross: A mathematical analysis & physical explanation of a long-forgotten observation of an optical caustic by Leonardo da Vinci”**

**Dr. James Lock, Physics Professor Emeritus**

In about 1508 Leonardo da Vinci observed a peculiar optical caustic produced by refraction, and sketched it in the margin of one of his more obscure notebooks. This observation was soon forgotten, and was rediscovered by an art historian in 1994, who published it in the art history literature, rendering it equally obscure to scientists. This talk will consist of four parts. (i) An outline the life of Leonardo da Vinci (1452-1519). (ii) Showing photos of number of familiar examples of optical caustics, which are produced by the partial focusing of light by a reflecting or refracting surface. (iii) A recounting of Leonardo’s well-known 1503 observation of a cusp caustic produced by reflection, which enjoys the status of being the first known scientifically accurate written description of an optical caustic. (iv) Lastly, a recounting of Leonardo’s 1508 long-forgotten observation of an astroid caustic produced by refraction, concluding with an outline of its mathematical analysis, and describing the surprising evolution of its shape for strongly diagonally incident light.

**Tuesday, October 12<sup>th</sup>, 2021**

**SR 151, 11:30 am**