Physics Seminar

The Schlieren Imaging Technique:

Examples and the Fourier Optics Analysis

Rebekah Olson
UNC Physics

Friday
April 30
3:30pm
Ross 0220

Originally considered a nuisance by astronomers, the effects on light by air and other inhomogeneous media are easy to see with the correct optical setup. First championed by August Toepler, the Schlieren imaging system uses a knife edge to enhance this effect by filtering collimated light after it passes through an area of study based on the produced path length differences. The result is a quantifiable visual depiction of the changes in index of refraction on the order of less than 1%, which are typically difficult to measure accurately. Example images and an optical setup will be presented. A discussion of Fourier Optics will help to model the lens, knife edge and viewing screen and further explain the physics behind this phenomenon.

Physics Seminar

Volumes of Hyperballs and Areas of Hyperspheres

Maurice Woods III
UNC Physics

Friday
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Though some may not be able to recite them at the tip of a hat, nearly every person who has taken a High School geometry class can recall the simple formulas for the area of a circle, $A = \pi \cdot r^2$, and the volume of a sphere, $V = \frac{4}{3} \cdot \pi \cdot r^2$. However, through years of increasingly advanced mathematics, many may begin to take these relationships for granted- Equations merely memorized for use in trivial computation. However, ***where*** did these expressions come from? Are there more interesting formulas similar to these beyond the 2nd and 3rd dimension? How are these equations related to one another? We will explore the intriguing origins and unique patterns associated with this simple set of equations, and attempt to better understand the special dimensions of which the universe exists. (Basic Calculus background, or a willingness to smile, nod, and accept, is recommended)