

## Experimental Methods in Nanotechnology

## Homework 1

Newton's rings are formed when a curved surface is placed above a flat surface, such as when a hemispherical lens sits on an optical flat. When viewed from above one can see that concentric interference fringes form as shown in the figure from [practicalphysics.org](http://practicalphysics.org). Assume there is a liquid between the lens and flat, with refractive index  $n$ , and the minimum distance between the two is  $h$  and the curved surface has a radius of curvature of  $R$ . Assume  $R$  is very large and the local gap between the two surfaces is always very small, determine relations for the radial position for local intensity minima and maxima. You would like to determine the minimum gap ( $h$ ) between the two surfaces, explain how you would do this. What wavelength light would you use, large or small? What do you think the smallest distance you could measure would be? Could this be a nanoscale characterization device?

