



University  
of Glasgow

格拉斯哥学院  
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电子科技大学  
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# Physical Experiments I

## Pre-lab Assignment

Experiment Title-Newton's rings

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Score

## **Answers to Questions** (20 points)

### **1. Why are Newton's rings circular?**

Because the thickness of the film, as the determinant of the interference pattern, is constant in the shape of a circle, and the path difference along the circle is also constant.

### **2. In modern physics, light has been demonstrated to have wave particle duality. Which nature is demonstrated in Newton's rings experiment?**

The wave character of light is demonstrated in Newton's rings experiment. Since Newton's rings are the phenomenon of the interference, and as we know the phenomenon of the interference is the direct evidence of the wave character of light

### **3. Why are the dark and bright fringes observed in Newton's rings?**

Because two glass plates are placed in contact at one end and are separated by some small distance at the other. Part of the light wave which reflected back at the boundary between the first glass plate and the space combine with another part of the light wave which travel across the space and is reflected back from the front surface of the second plate at the same point. When the difference in path lengths is exactly an integral number of wavelengths, the waves recombine in phase, and constructive interference(that is, bright fringes) occurs. When the path lengths differ by exactly one half-wavelength, the waves are out of phase when they recombine and destructive interference(that is, dark fringes) occurs. Besides the sodium light used is monochromatic light, so they are dark and bright fringes instead of colored fringes.

### **4. The sodium lamp in this experiment has two yellow components. Why can it be used as the light source for the experiment?**

Firstly, although they are double lines(588.9950nm and 589.5924nm,respectively), there are just really little difference between them, it is the monochromatic light. Secondly, the wavelength range of the visible light is between 380~780nm, and the wavelength of sodium light consists of two wavelengths(588.9950nm and 589.5924nm,respectively) which belong to the wavelength range of the visible light so that researchers can observe the phenomenon. Thirdly, only monochromatic light, light of a single wavelength, is supposed to be used in this experiment to avoid generating colored fringes, and the sodium light is the monochromatic light.