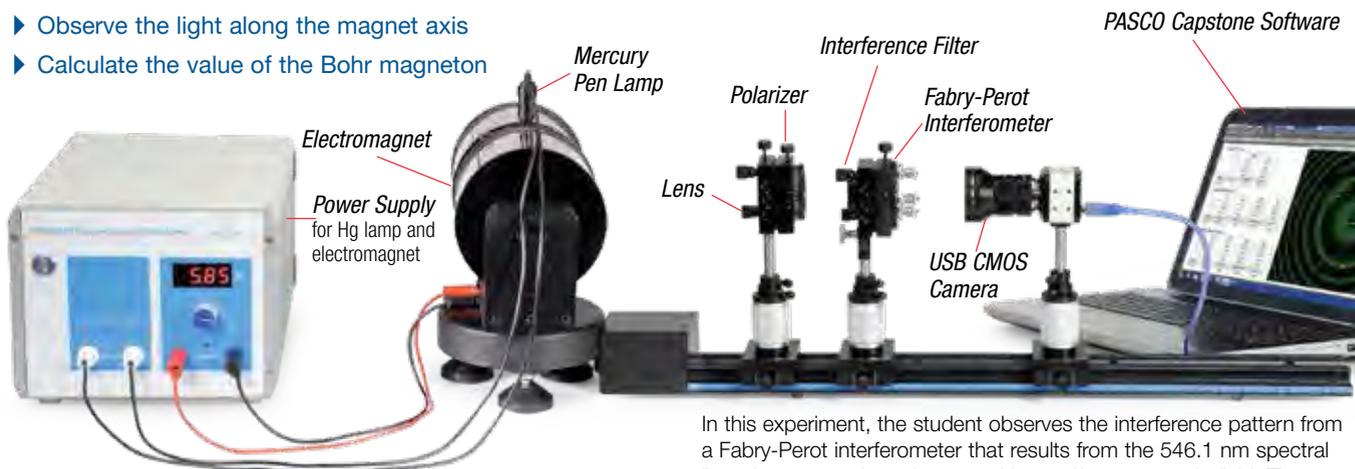


# Zeeman Effect

SE-9654

- ▶ Measure the Zeeman Effect with polarization perpendicular and parallel to the field
- ▶ Observe the light along the magnet axis
- ▶ Calculate the value of the Bohr magneton

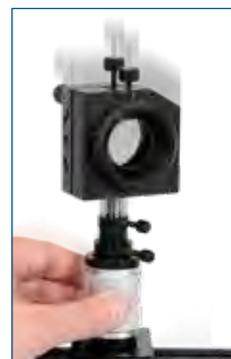
See complete experiment on page 390.



End view through the axis of the magnet



Electromagnet produces over one Tesla.



The vertical position can be adjusted precisely with the fine-adjust mechanism.



Lens and polarizer mount can be adjusted vertically and horizontally.



The optics and track come in an aluminum hard case with foam cutouts for each component.

In this experiment, the student observes the interference pattern from a Fabry-Perot interferometer that results from the 546.1 nm spectral line of a mercury lamp immersed in a uniform magnetic field. The magnetic field is varied from zero to nearly 1 Tesla.

Initially, the light is viewed along an axis perpendicular to the magnetic field axis. A polarizer is used to show the three lines due to light that is polarized parallel to the field axis and to show the six lines that are polarized perpendicular to the field axis. The pattern may also be viewed along the field axis where the light is circularly polarized.

Finally, the pattern that is polarized perpendicular to the field axis is used to calculate the Bohr magneton. All atomic magnetic moments are integral or half-integral multiples of the Bohr magneton.

### Specifications

<b>CMOS Camera and Lens</b>	1/3", 2M pixels, f=50 mm, RA=1:4
<b>Fabry-Perot Interferometer</b>	$\lambda=546.1$ nm
<b>Collimating Lens</b>	f=125 mm
<b>Mercury Lamp</b>	10A, 3W
<b>Electromagnet</b>	5A, 1.2T, ~ 7.4 mm gap
<b>Tunable DC Power Supply</b>	110V/220V, 6A
<b>Precision Adjustable Optical Mount</b>	$\Phi 45$ mm, 2D
<b>Horizontal Optical Mount</b>	$\Phi 45$ mm, travel = 36 mm, 2D
<b>Track Length</b>	600 mm

### Includes

- Electromagnet
- Power supply
- Optics
- PASCO Capstone Single User License.

### Order Information

Zeeman Effect .....	SE-9654
<i>May be purchased separately:</i>	
Electromagnet .....	SE-9655
Tunable DC Power Supply 6A.....	SE-9656
<i>Replacement Part:</i>	
Mercury Pen Lamp .....	SE-9658
<i>Optional:</i>	
Tesla Meter.....	SF-7579A p. 248

Field strength as a function of the current supplied to the magnet is included in a chart. To directly measure field strength, order the optional Tesla Meter (SF-7579).

# Quantum

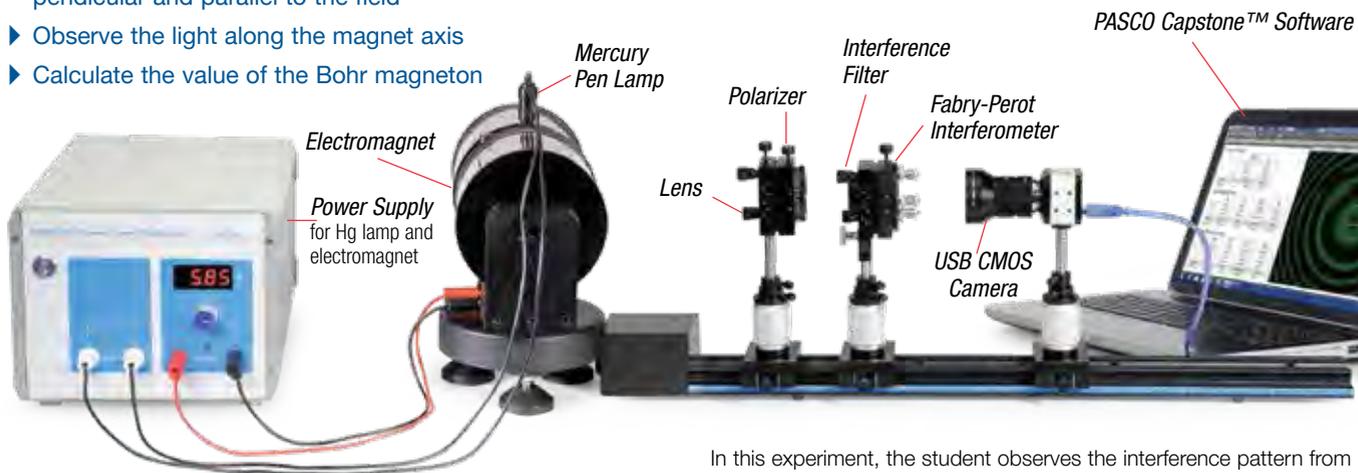
## Zeeman Effect

No interface required

EX-5562

### Concepts:

- ▶ Measure the Zeeman Effect with polarization perpendicular and parallel to the field
- ▶ Observe the light along the magnet axis
- ▶ Calculate the value of the Bohr magneton



End view through the axis of the magnet

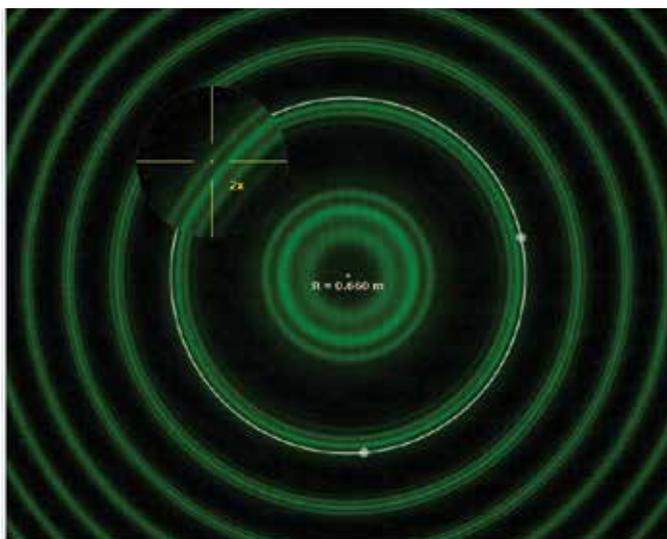


Electromagnet produces about one Tesla.

In this experiment, the student observes the interference pattern from a Fabry-Perot interferometer that results from the 546.1 nm spectral line of a mercury lamp immersed in a uniform magnetic field. The magnetic field is varied from zero to nearly 1 Tesla.

Initially, the light is viewed along an axis perpendicular to the magnetic field axis. A polarizer is used to show the three lines due to light that is polarized parallel to the field axis and to show the six lines that are polarized perpendicular to the field axis. The pattern may also be viewed along the field axis where the light is circularly polarized.

Finally, the pattern that is polarized perpendicular to the field axis is used to calculate the Bohr magneton. All atomic magnetic moments are integral or half-integral multiples of the Bohr magneton.



### PASCO Advantage

In PASCO Capstone software, students can use the video magnifier tool to enlarge the region to see the details of the line splitting. Also, the radius tool needs only three points to define the circle, so even rings that are partially out of view can be measured.

### Includes

- Electromagnet
- Power Supply
- Optics
- Tesla Meter
- PASCO Capstone Single User License

### Order Information

Zeeman Effect .....EX-5562  
 Required:  
 PASCO Capstone Software..... pp. 72-75

### Download This Experiment

The FREE experiment files include instructions in Microsoft Word®, PASCO Capstone workbook files with sample data, and graphics. Download these experiments at [www.pasco.com/CapstoneExperiments](http://www.pasco.com/CapstoneExperiments).