Physics & Astronomy Alumni Panel

Dr. Meredith Dyck '98
Chief Strategist for Microelectronics, National Security Agency

Meg Mullin '17
Vice President, Fixed Income Syndicate Trader, Wellington Management

Dr. Matt Paoletti '05
Senior Staff Systems Engineer, Northrop Grumman

Register on Handshake

Thursday, February 26
7 - 9 p.m.
Hildreth-Mirza Humanities Center, Great Room

Hear from a group of Bucknell alumni as they share their career paths, advice and real-world perspectives. Join us for the conversation — light refreshments provided.

Bucknell UNIVERSITY | Center for Career Advancement

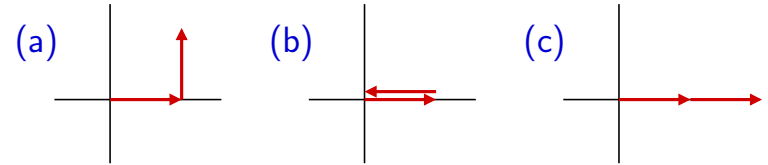
Physics & Astronomy Speaker Series

Dr. Matthew Paoletti ‘05

Quantum Turbulence You Can See: Experiments in Superfluid Helium

Lecture 11 — Concept Test 1

What is the phase difference $\Delta\phi$ for each of these cases?



1. (a) $\pi/2$, (b) π, (c) 2π

2. (a) $\pi/2$, (b) 2π, (c) 0

3. (a) $\pi/4$, (b) $\pi/2$, (c) π

4. (a) $\pi/4$, (b) π, (c) 2π

5. (a) π, (b) 2π, (c) 4π

6. (a) π, (b) $\pi/2$, (c) π

Lecture 11 — Concept Test 2

Two speakers emit sounds with wavelength 2 m (in phase when emitted). If $\Delta r = 0.5\,\text{m}$, what is $\Delta\phi$?

1. 0
2. $\pi/4$
3. $\pi/2$
4. $3\pi/4$
5. π
6. $3\pi/2$

Phase difference
$\Delta\phi$

$\Delta\phi = 2\pi\dfrac{\Delta r}{\lambda}$

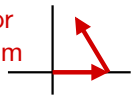
Path length difference
Δr

$\Delta r = r_2 - r_1$

or

$\Delta r = d\sin\theta$ if $d \ll L$

phasor diagram



Interference

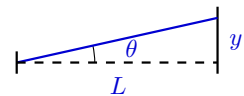
constructive,

destructive,

maxima, minima

Geometry

- pythagoras
- $y = L\tan\theta$



- $\sin\theta \simeq \tan\theta$ for small θ

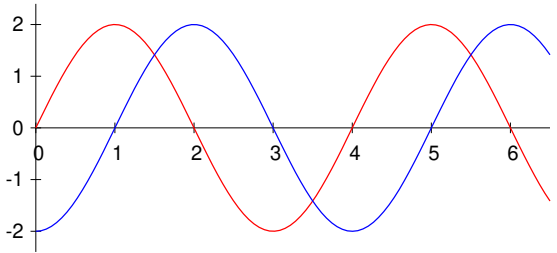
Lecture 11 — Concept Test 3

Light of wavelength 500 nm passes through a pair of slits with spacing $d = 1500$ nm. What is the phase difference and path length difference between the beams arriving at the point on a distant screen corresponding to the second side minimum?

1. $\Delta\phi = 0$; $\Delta r = 0$
2. $\Delta\phi = 2\pi$; $\Delta r = 1500\,\text{nm}$
3. $\Delta\phi = 3\pi$; $\Delta r = 1500\,\text{nm}$
4. $\Delta\phi = \pi$; $\Delta r = 250\,\text{nm}$
5. $\Delta\phi = 2\pi$; $\Delta r = 500\,\text{nm}$
6. $\Delta\phi = 3\pi$; $\Delta r = 750\,\text{nm}$

Lecture 11 — Concept Test 4

The diagram shows plots of two different oscillations. What is the phase difference between these two oscillations?



1. 0

2. $\pi/8$

3. $\pi/4$

4. $\pi/2$

5. π

6. 2π