

Physics & Astronomy Seminar

Studying Few- and Many-Particle Quantum Physics with Rydberg Atoms



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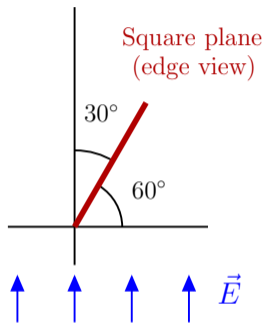
Olin 268. Thursday, January 29 at 12:00

Pizza provided. Bring your own water bottle.

Lecture 3 — Concept Test 1

A square with side a is in an electric field with magnitude E , as shown in the diagram. What is the electric flux through the square?

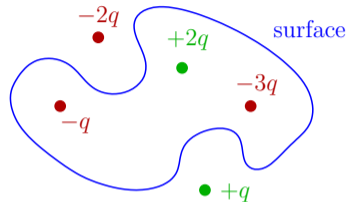
1. 0
2. $a^2 E \cos 30^\circ$
3. $a^2 E \cos 60^\circ$
4. None of these



Lecture 3 — Concept Test 2

What is the electric flux through the surface?

1. 0
2. $-q/\epsilon_0$
3. $-2q/\epsilon_0$
4. $-3q/\epsilon_0$
5. $+q/\epsilon_0$
6. $+2q/\epsilon_0$



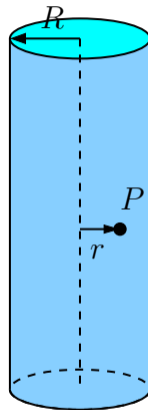
Step-by-Step Method for Gauss's Law Problems

1. Write down Gauss's Law: $\Phi_E = q_{\text{enc}}/\epsilon_0$.
2. Draw an appropriate Gaussian surface that contains the point P . Look for a surface where $\vec{E} \cdot d\vec{A}$ is 0 or a constant everywhere.
3. Work on the left side: express Φ_E in terms of E .
4. Work on the right side: find q_{enc} in terms of the given charge.
5. Plug the left side and the right side into Gauss's Law and solve for E (magnitude).

Lecture 3 — Concept Test 3

Without doing any calculations, what is the direction of the electric field near the middle of the cylinder (i.e., away from the ends) but not on the axis?

1. Radially outward
2. To the left everywhere
3. Downward everywhere
4. To the right everywhere
5. Upward everywhere
6. Not enough info



Lecture 3 — Concept Test 4

(a) What is the flux Φ_E^{caps} for the end caps of the cylinder in terms of the unknown electric field magnitude E ?

1. 0

3. $2\pi R^2 E$

5. $\pi R^2 E$

2. $2\pi r^2 E$

4. $\pi r^2 E$

6. $2\pi r h E$

(b) What is the flux Φ_E^{round} for the round part of the cylinder in terms of the unknown electric field magnitude E ?

1. 0

3. $2\pi R^2 E$

5. $\pi R^2 E$

2. $2\pi r^2 E$

4. $\pi r^2 E$

6. $2\pi r h E$