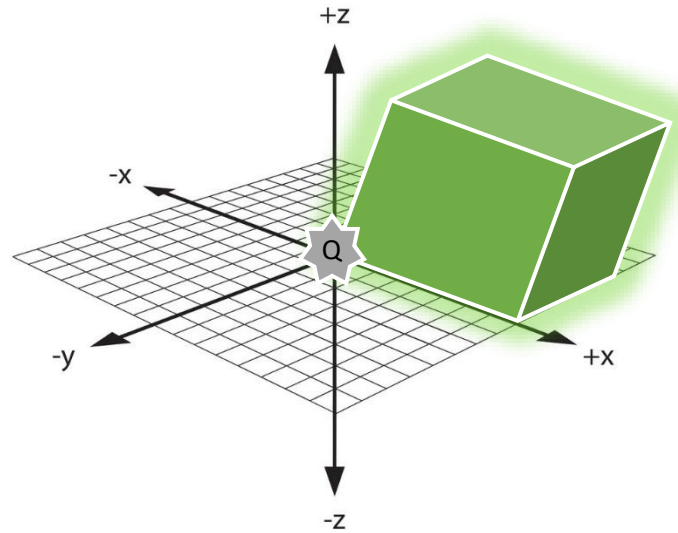


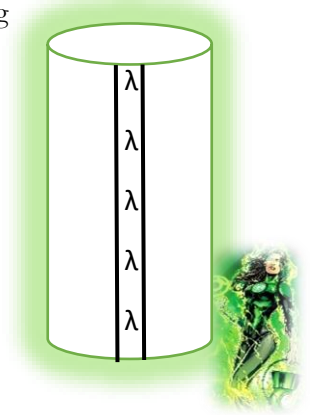
Discussion Week 3 Problem 1

While the box office is still out on the success of *Spider-Man 4*, you get hired by the Distinguished Competition to be the science consultant for James Cameron's *Green Lantern* film, based on a script by J. Michael Straczynski. The beginning of the film opens with a burst of color as an electric field comes out from a center source of 50×10^6 MC. Eight Gaussian cubes of side length 0.2 ly form around the white power source with a corner of each cube touching the white charge as the charge's color gets fractured. What is the electric flux through one of the cubes? (Pictured is a diagram of the Green cube with a corner touching the charge source). Which sides of the cube have 0 electric flux?



Discussion Week 3 Problem 2

On the Planet Oa, at the core of the planet, there is the 3Gm tall Central Power Battery, which we will Model as a cylinder with a base diameter of 0.75km. In the center of the Central Power Battery, there is a line of charge with charge density 20MC/m . The battery feeds off charge from it's surface to power the Green Lantern Corps. If a Green Lantern places his power ring onto the surface of the Central Power Battery, what is the electric field that will feed into their ring? What would be the electric flux through the power ring on the surface cylinder if the ring's radius is 0.5 cm?



Discussion Week 3 Problem 3

Near the climax of the film, the Green Lanterns encounter a 4.4 lightyear radius sphere of fear created by the Sinestro corps. The Fear Sphere transmits fear to the inhabitant planets caught inside of it in the same way a nonconducting sphere distributes charge. In fact, the Green Lantern corps realizes they can model the fear sent to a planet caught in the sphere as a varying volume charge density. If the volume charge density varies as $\rho = (5 \times 10^5 \text{ kC/m}^3) * r/R$, what is the total charge within the sphere? The ratio of fear at half the radius to the full radius of the fear sphere is equal to the ratio of the magnitudes of the electric field at half the radius to that of the full radius, what is the ratio?

