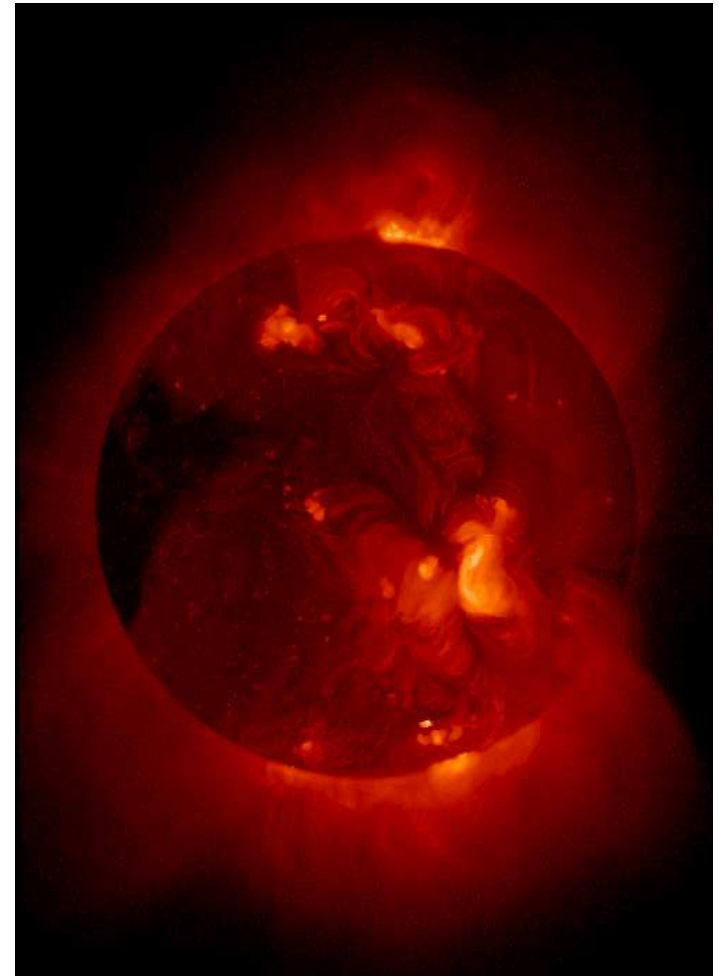


Why Does the Sun Shine? (E&M??)

1. Newton's Law of Universal Gravitation shares many attributes of Coulomb's Law including the $1/r^2$ dependence on the separation between point particles.

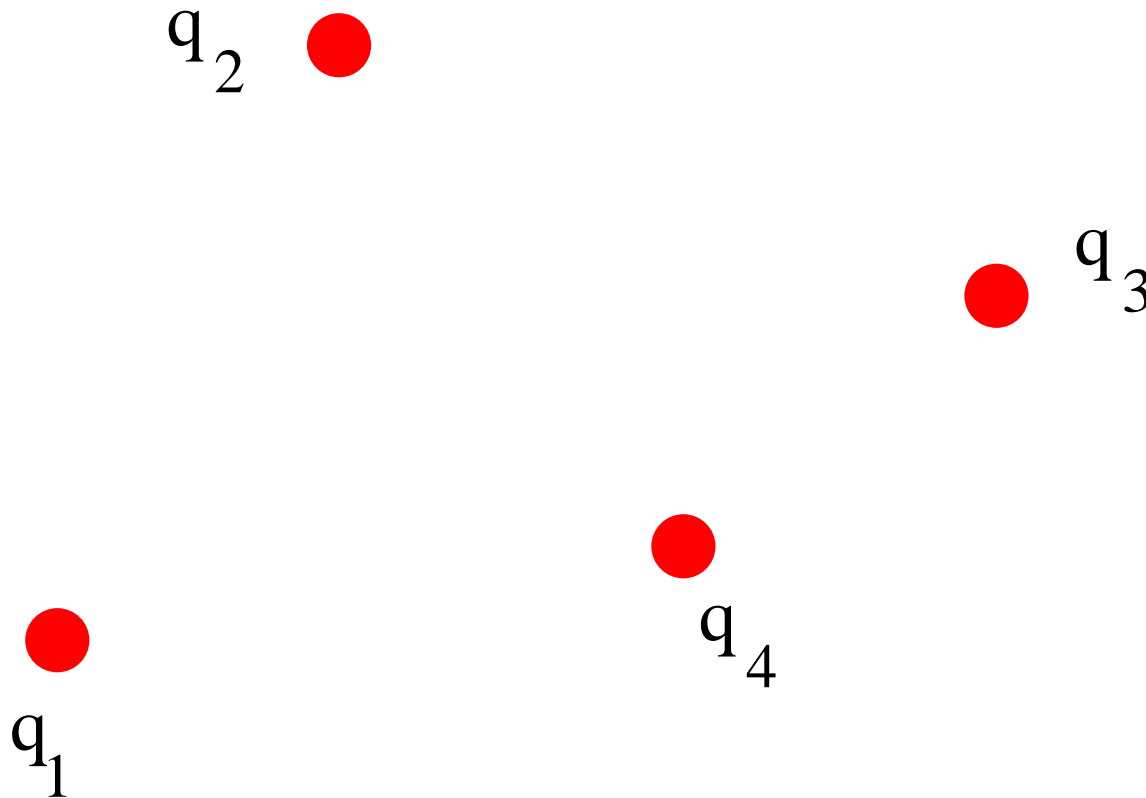
$$\vec{F}_C = \frac{1}{4\pi\epsilon_0} \frac{qQ}{r^2} \hat{r} \quad \vec{F}_G = -G \frac{mM}{r^2} \hat{r}$$

2. What is the gravitational energy of a sphere of mass M and radius R ? Our Sun has $M = 1.991 \times 10^{30} \text{ kg}$ and $R = 6.96 \times 10^8 \text{ m}$.
3. The Sun produces about $3.86 \times 10^{26} \text{ J/s}$. If the source of the Sun's energy is the energy stored in the field, how long would it last?



Assembling a Charge Distribution

Consider the charge distribution shown below. How much work has to be done to create it from nothing?



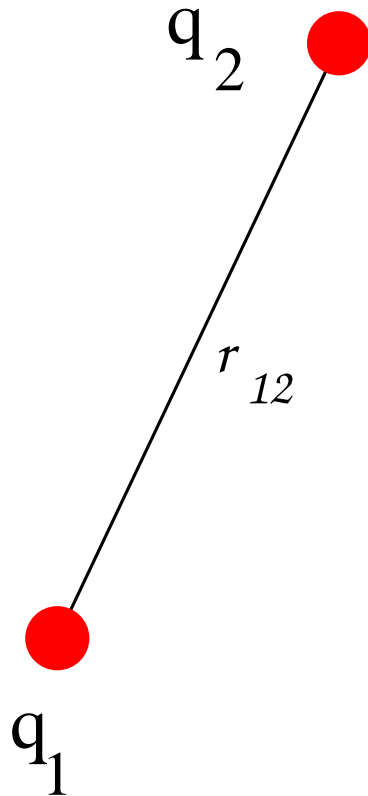
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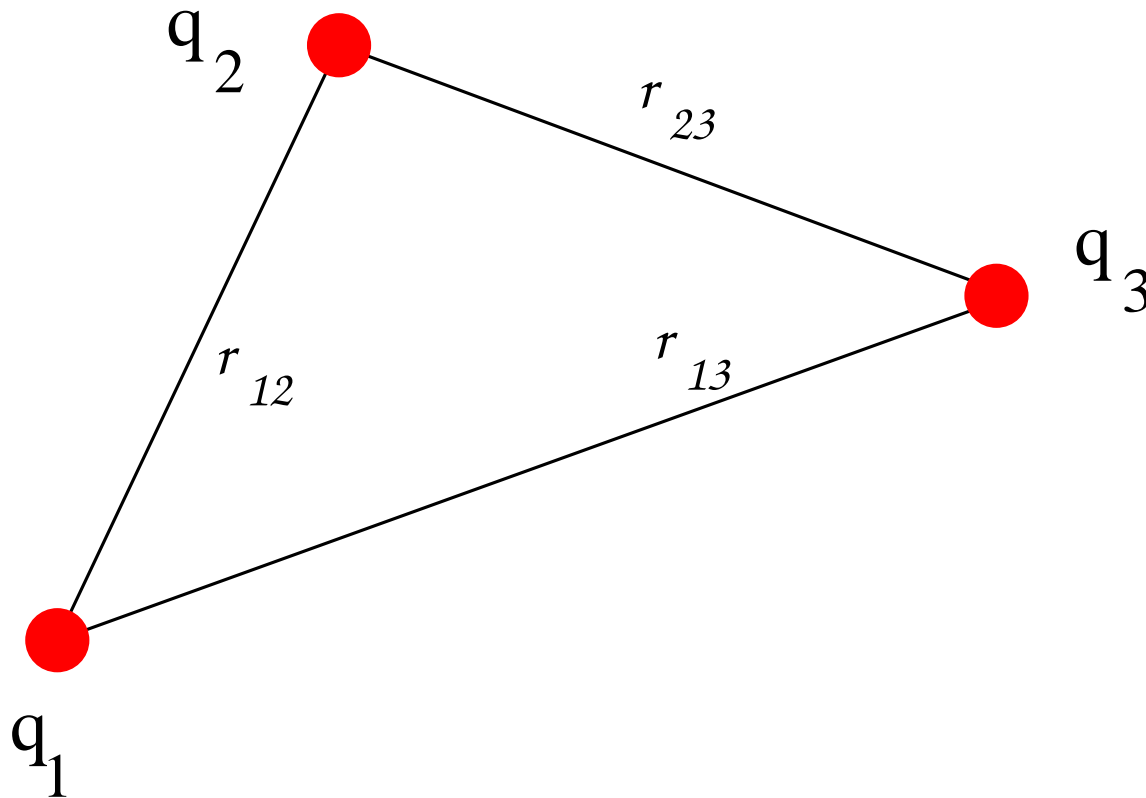
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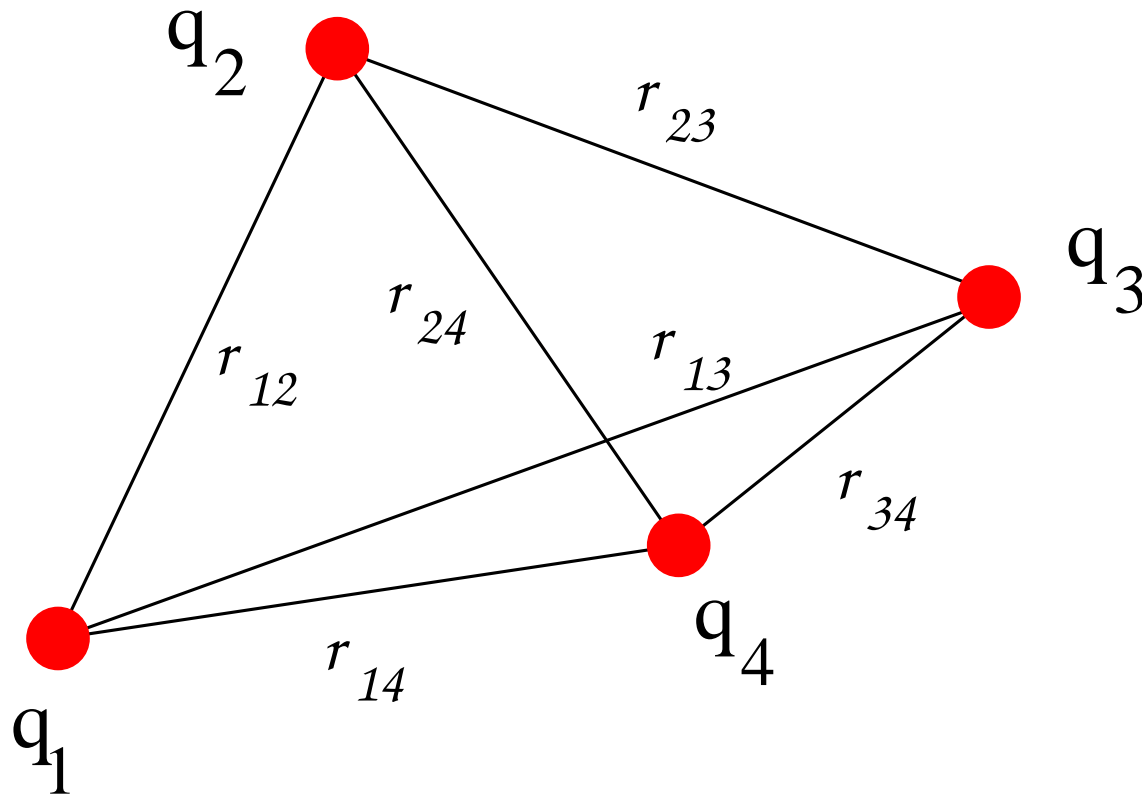
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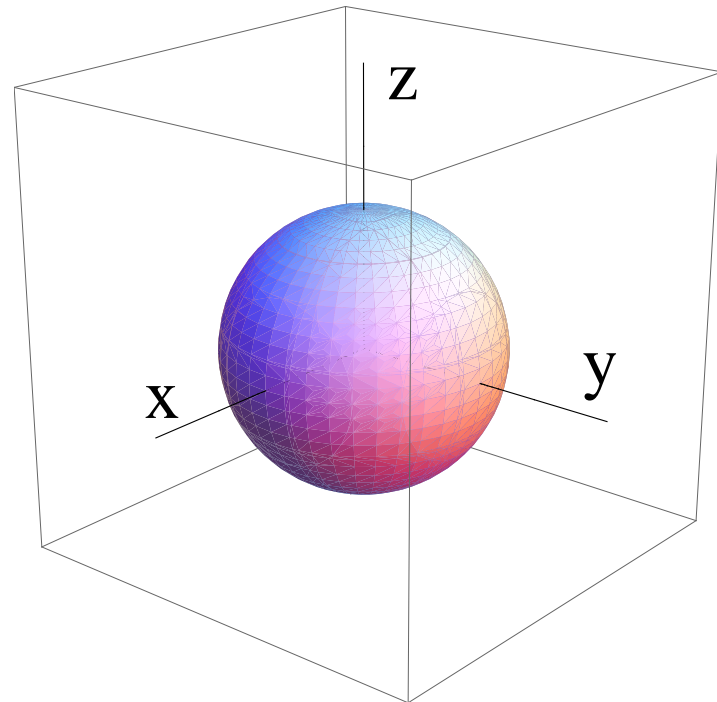


Energy of a Charge Distribution

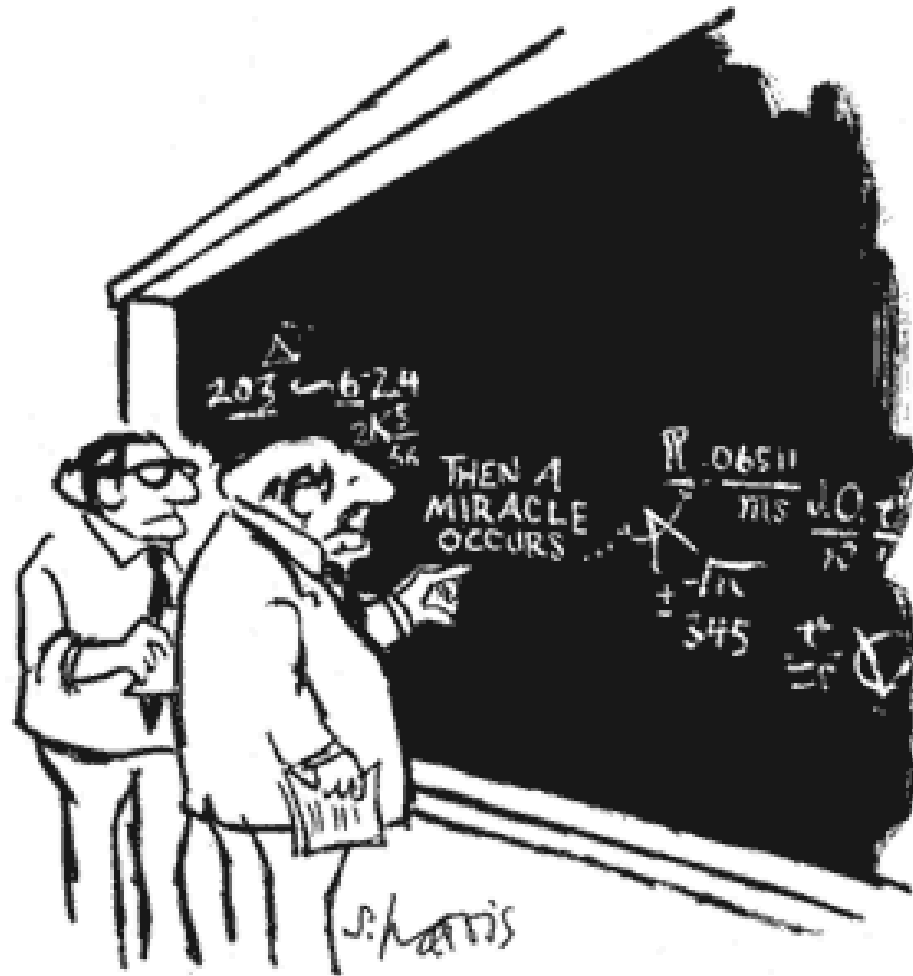
What is the energy stored in a uniformly charged solid sphere of radius R and charge Q ? Use

$$W = \frac{\epsilon_0}{2} \left(\int_V E^2 d\tau + \oint_S V \vec{E} \cdot d\vec{A} \right)$$

to calculate the energy.



Energy of a Charge Distribution



"I THINK YOU SHOULD BE MORE EXPLICIT HERE IN STEP TWO."

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