The incredible power of unbalanced electrical charges

Richard Feynman
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Transcript source:
https://www.feynmanlectures.caltech.edu/flptapes.html
Lecture **#S1** Electromagnetism (9/27/62)
From [06:06] to [08:02]

Caltech Feynman Lectures transcript (1964) for the same audio:
https://www.feynmanlectures.caltech.edu/II_01.html#Ch1-S1-p2
https://www.feynmanlectures.caltech.edu/II_01.html#Ch1-S1-p3

Exact transcript, including word stumbles (this document):
http://sarxiv.org/flp.1962-09-27.s1.0606-0802.pdf

[6:06] But they will attract each other, the positives and the negatives, the protons and the electrons, until they'll form the most intimate possible mixture because of this enormous force. [6:17] And so, the net result of this terrific force is to balance itself out in most perfection, by forming very tight, fine, intimate mixtures of positive and negative charges. [6:28] So fine and so perfectly are these terrific forces balanced, that the net result… [6:38] For example, if I have here a big box of plus and minus — well, a piece of stuff like myself, for example — with plus and minus charges all over the place, inside, [6:47] if I have, say, a plus charge at a distance from it, there'll be very little force [6:51] because, although there is enormous repulsion from all the protons, there is an equally enormous attraction to all the electrons, [7:00] and the whole thing balances out with a precision — with a great precision — so there's no net force. [7:05]

[7:05] So that, for example, between you — say they're 10 meters away back there, a particular individual — and myself, there's practically no electrical force. [7:16] On the other hand, the force that really exists would be incredible. If, [7:20] for example, I were to have a lack of equilibrium, a lack of balance, by 1% excess electrons, and the same with the man up there, [7:28] if we each had an excess of 1% more minus charges than plus charges, then we would repel each other by an incredible force. [7:38] How great? Enough force to lift the Empire State Building? No! [7:43] Mt. Everest? No! [7:45] Enough force to lift a weight equal to the mass — the weight — of the entire — of another entire Earth — standing next to the Earth. [7:52] So incredible is this that I made the calculation four times, hoping, thinking, "I must have made a mistake in the decimal point," and I hoped that somebody would check me and find out that it really is only the Empire State Building. [8:02]

NOTES: The Lectures equivalent from 1964 is shorter, less colorful, and — surprisingly, given Feynman's insistence that he did his calculation four times — changes Feynman's precise assumption of "10 meters away" to an informal and much smaller "arm's length" (one meter?) away. The audio mentions "10 meters," "back there," and "up there", all of which contradict the idea he meant someone standing next to him. Why the Lectures editors replaced the precise "10 meters" with the imprecise "arm's length" is unclear.