PHY 117 HS2024

Week 9, Lecture 1
Nov. 12th, 2024
Prof. Ben Kilminster

Potential Energy

Gravitational

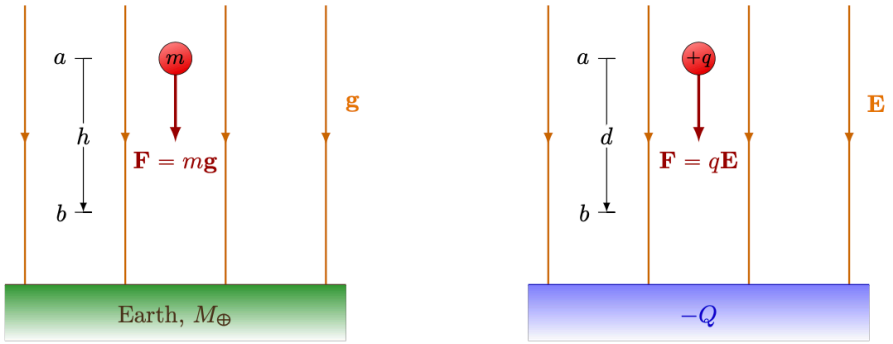
ball, mass m

a: initial
b: final

Electrical

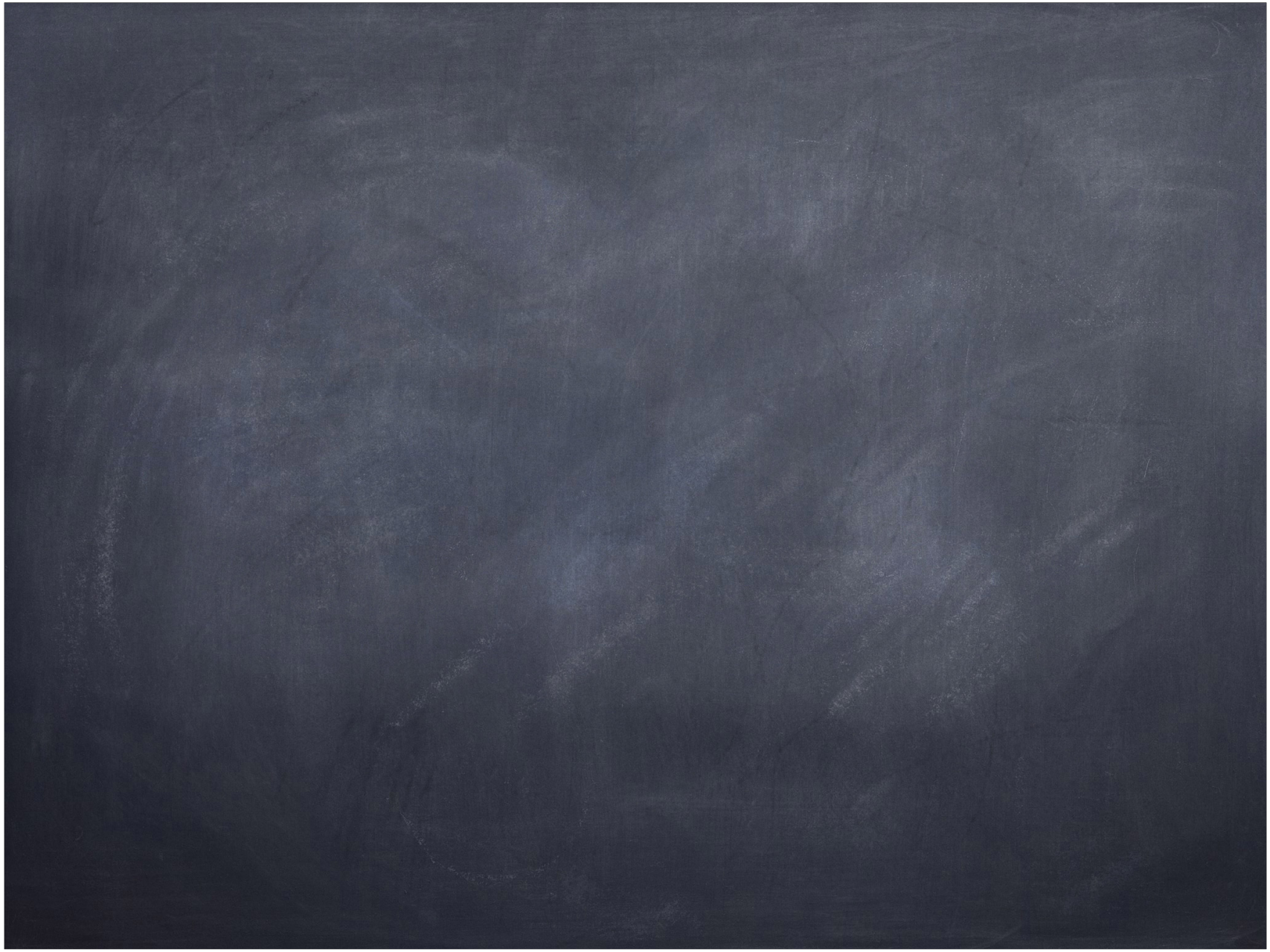
$\oplus$ q_0

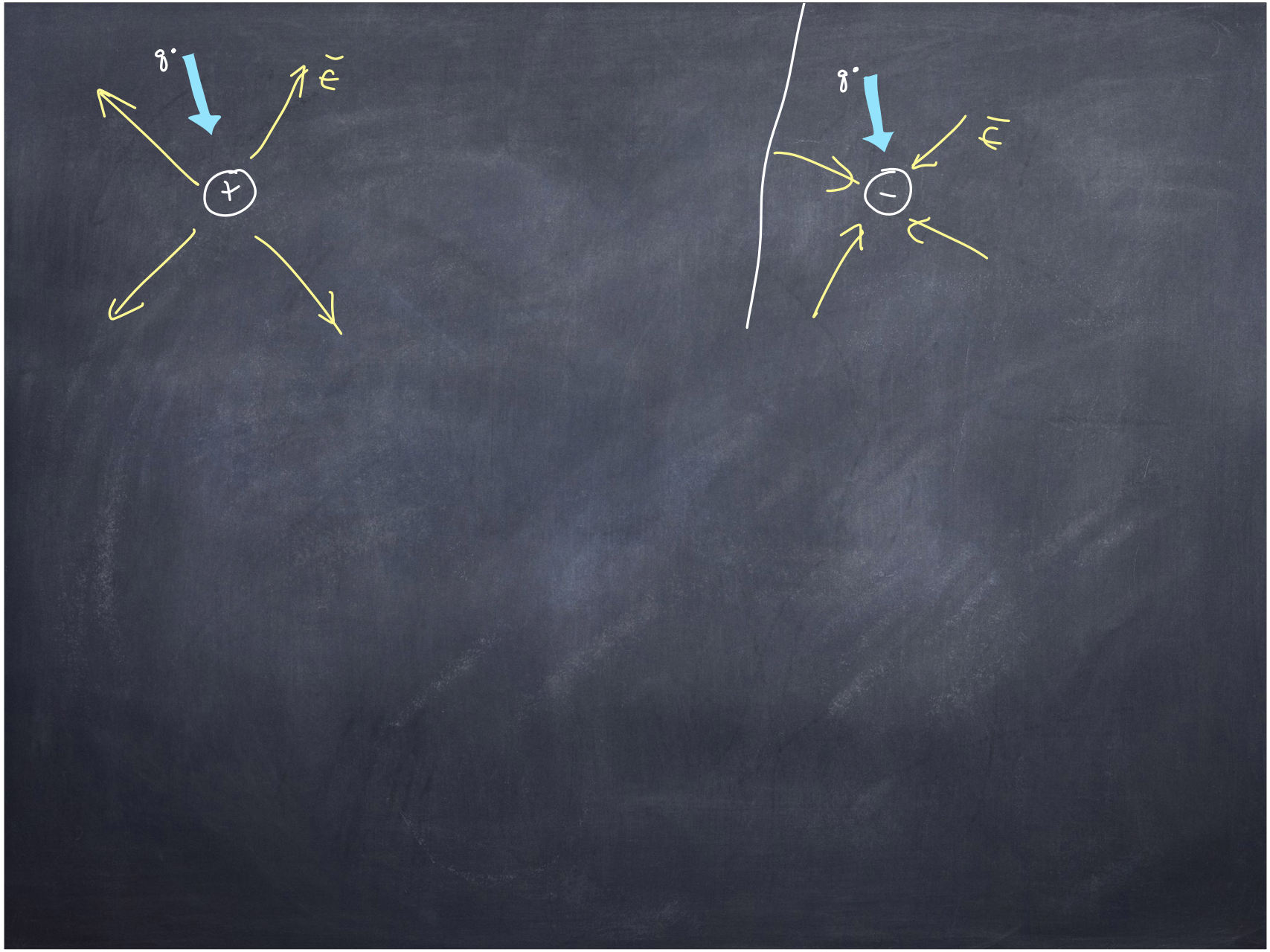
3.1 Electric potential energy



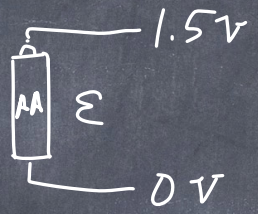
(a) Gravitational: $\Delta U = -mgh$. **(b)** Electric: $\Delta U = -qEd$.

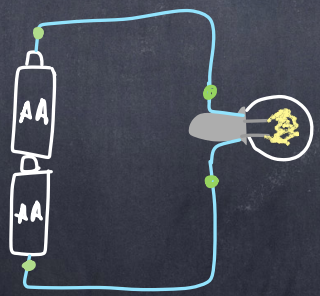
Figure 3.1: Comparison of potential energy difference $\Delta U = U_b - U_a$ in a force field.

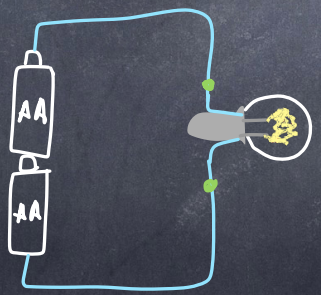



g
+
g
−

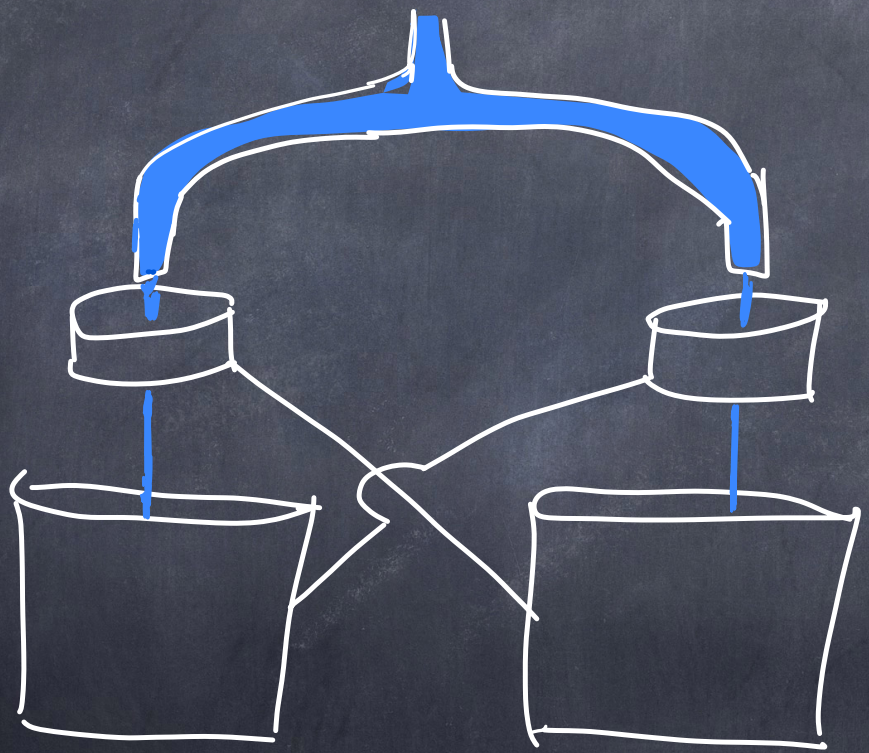
we can make a potential difference with a chemical battery



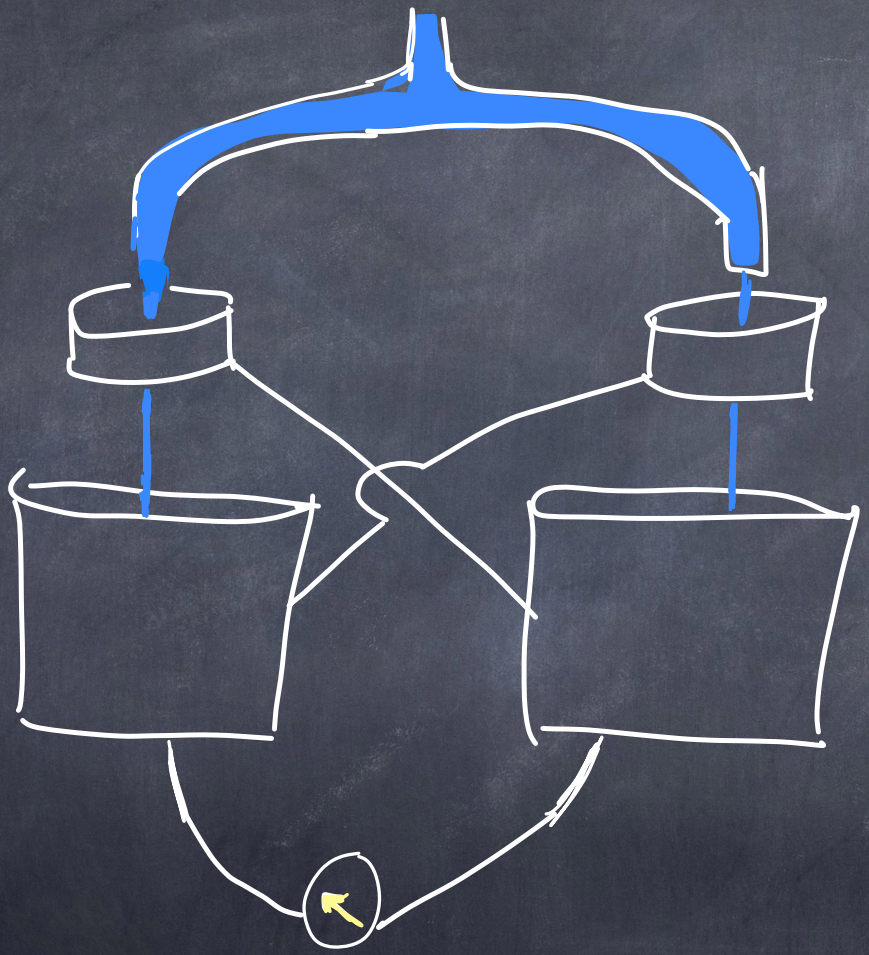




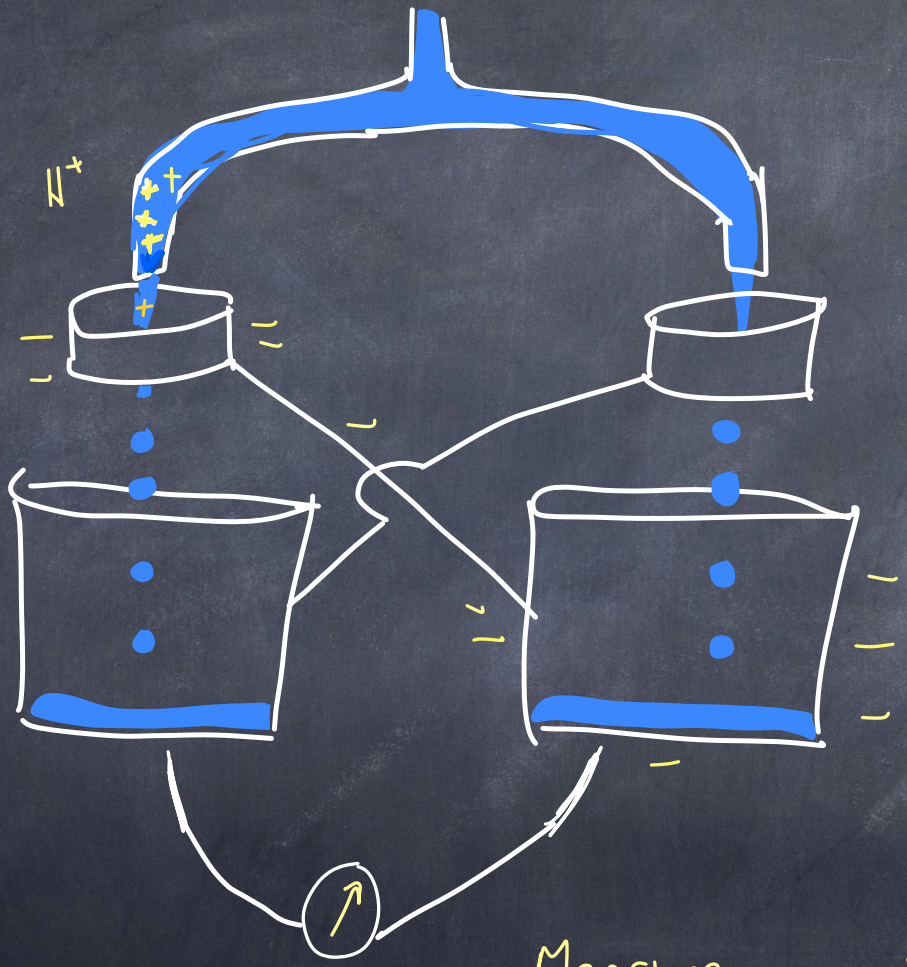
we can charge one conductor with respect to another, to create a potential difference.



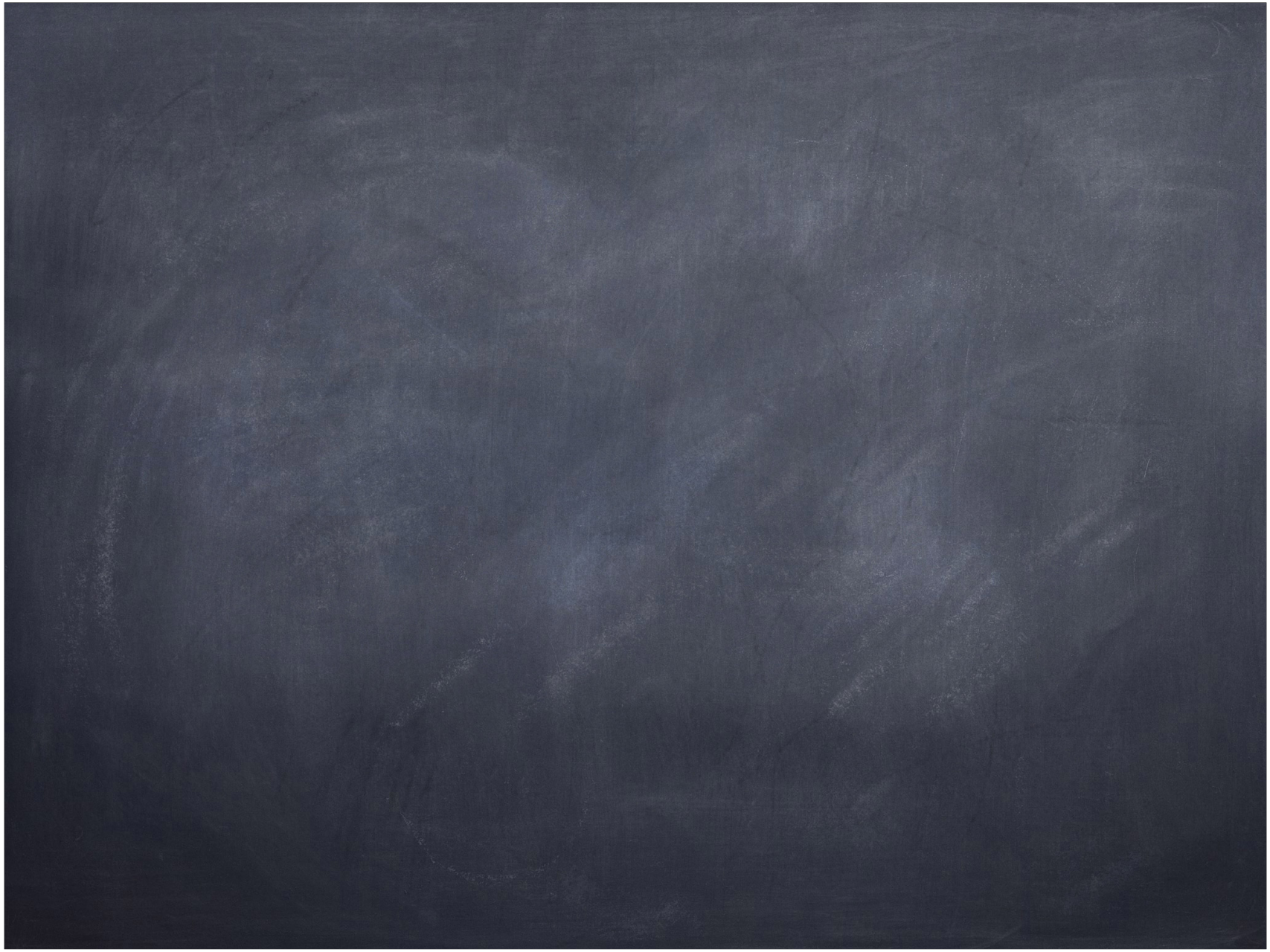
Kelvin generator (Kelvin water dropper)

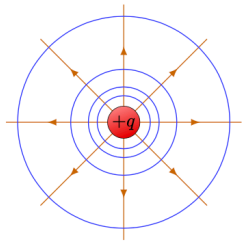


Kelvin generator (Kelvin water dropper)

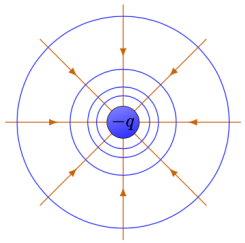


Measure
↖ The voltage difference
(relates to charge)

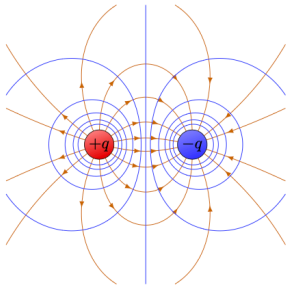




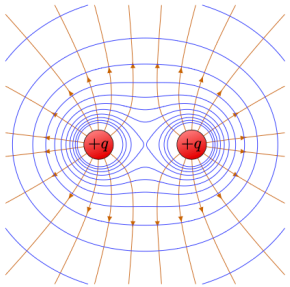
(a) Positive charge.



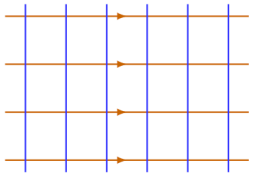
(b) Negative charge.



(c) Opposite point charges.

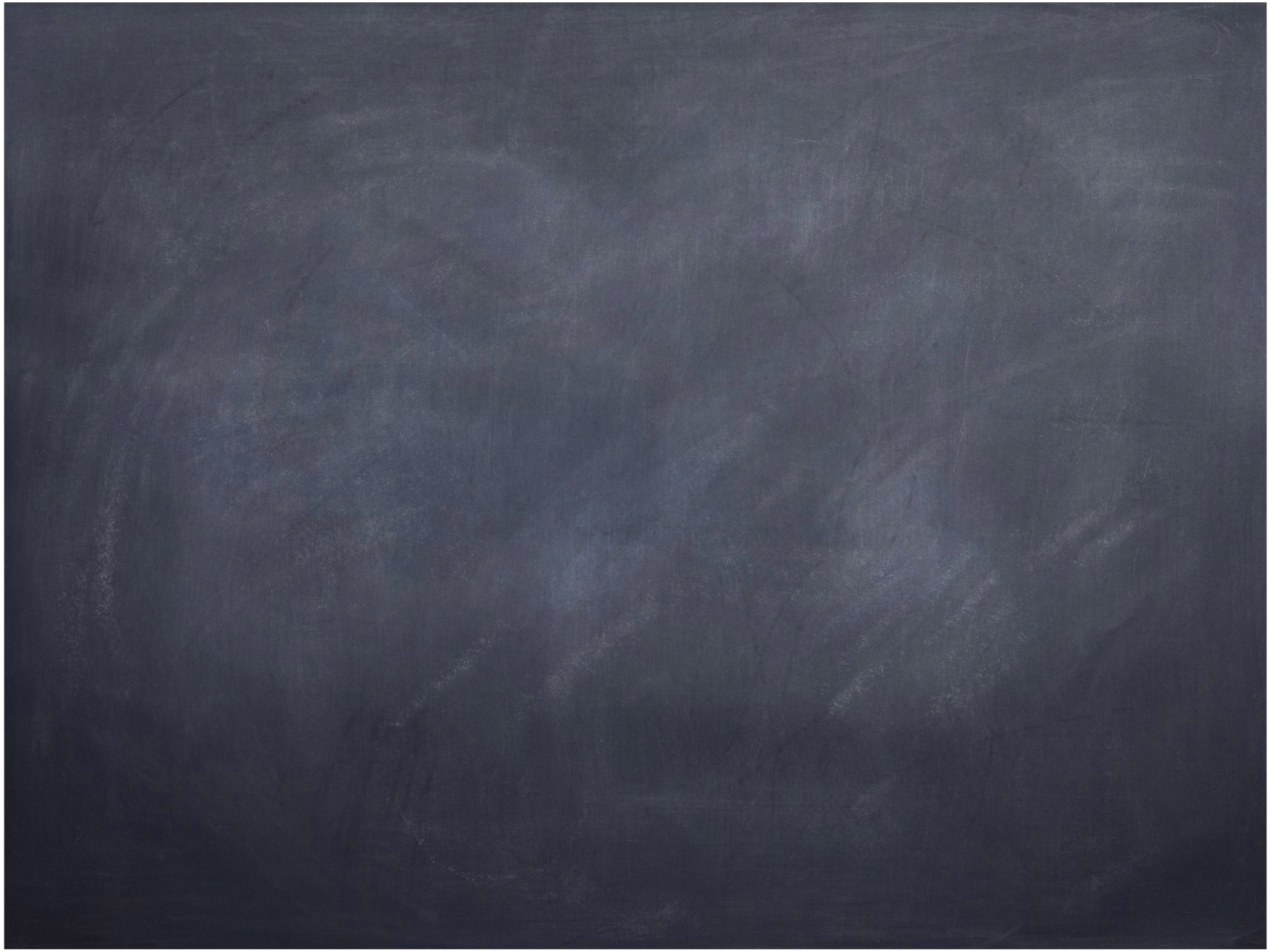


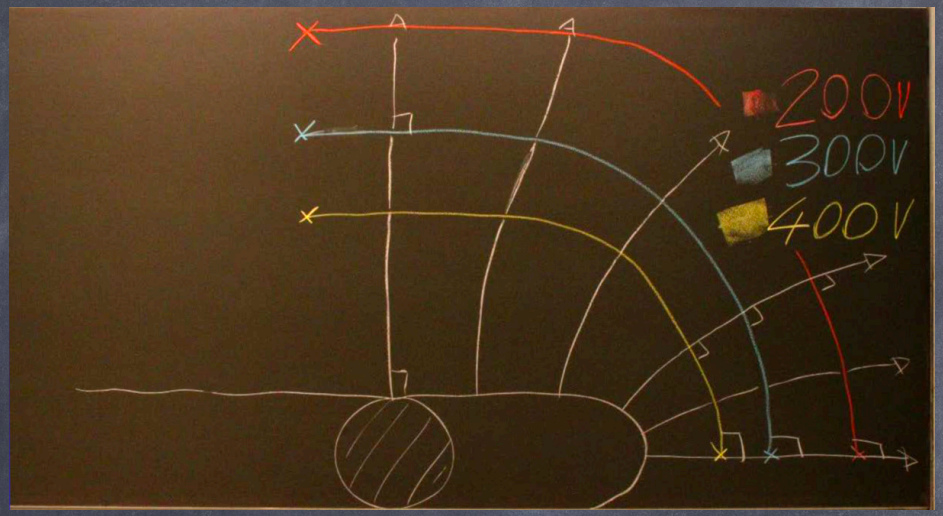
(d) Same-sign point charges.

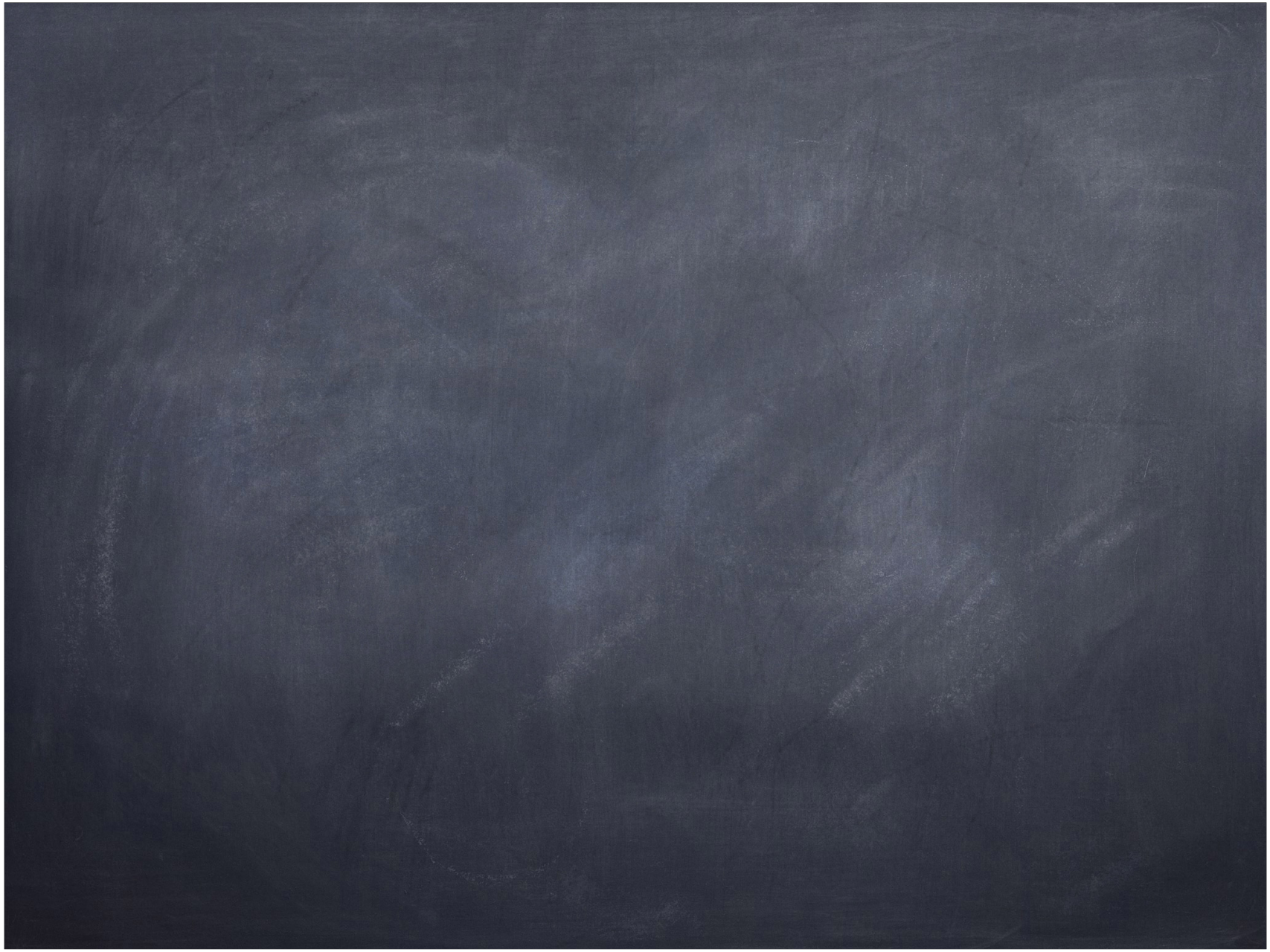


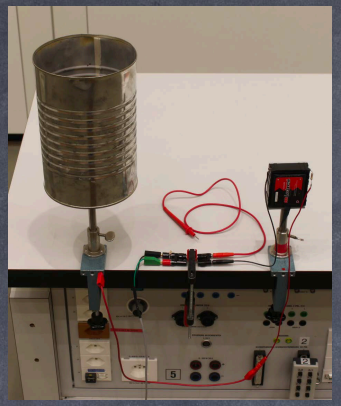
(e) Uniform field (like for a infinite sheet of charge).

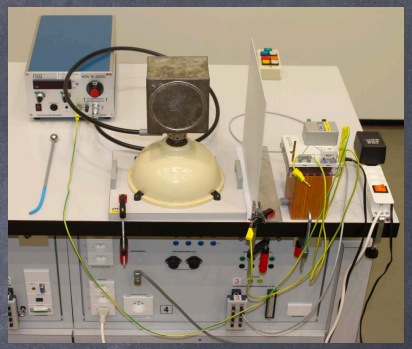
Figure 3.6: Equipotential surfaces (blue) of electric field lines (orange) for different configurations of point charges. All the points on the same equipotential have the same electric potential. The equipotential are equidistant to each other: Two neighbouring equipotentials differ by a fixed voltage ΔV.



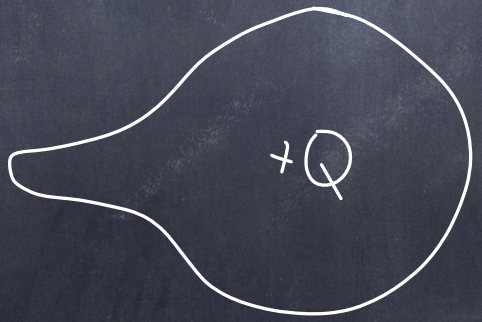

200V
300V
400V

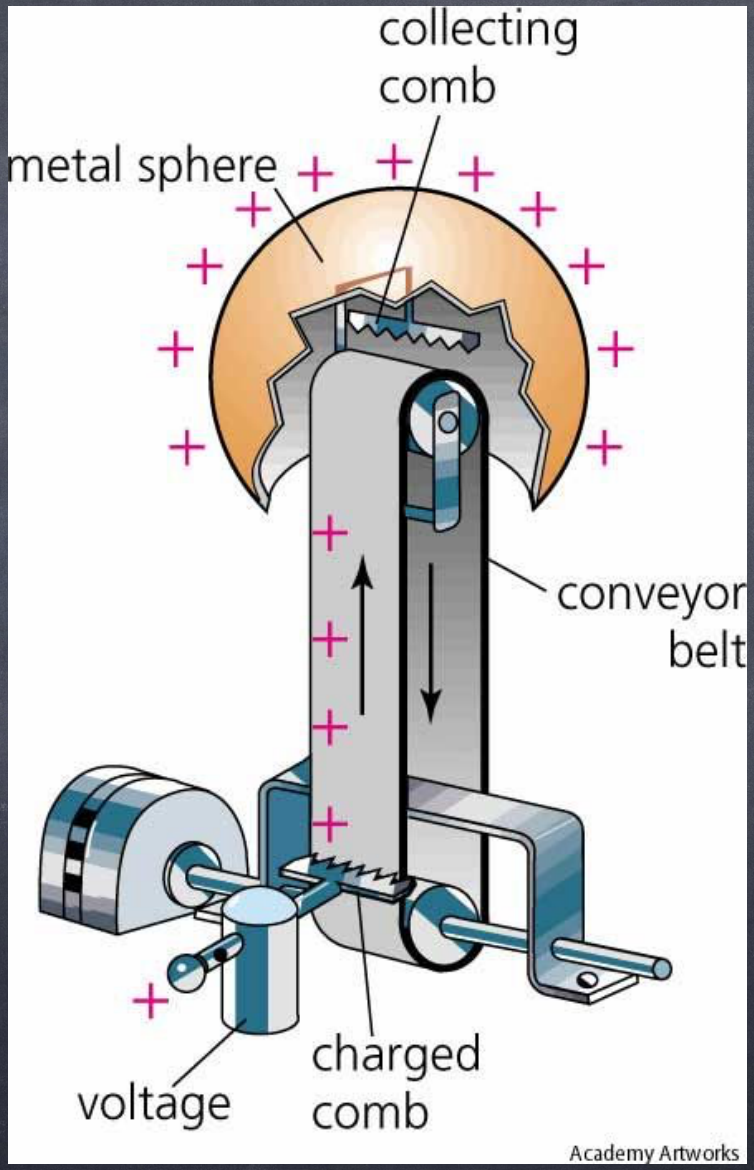


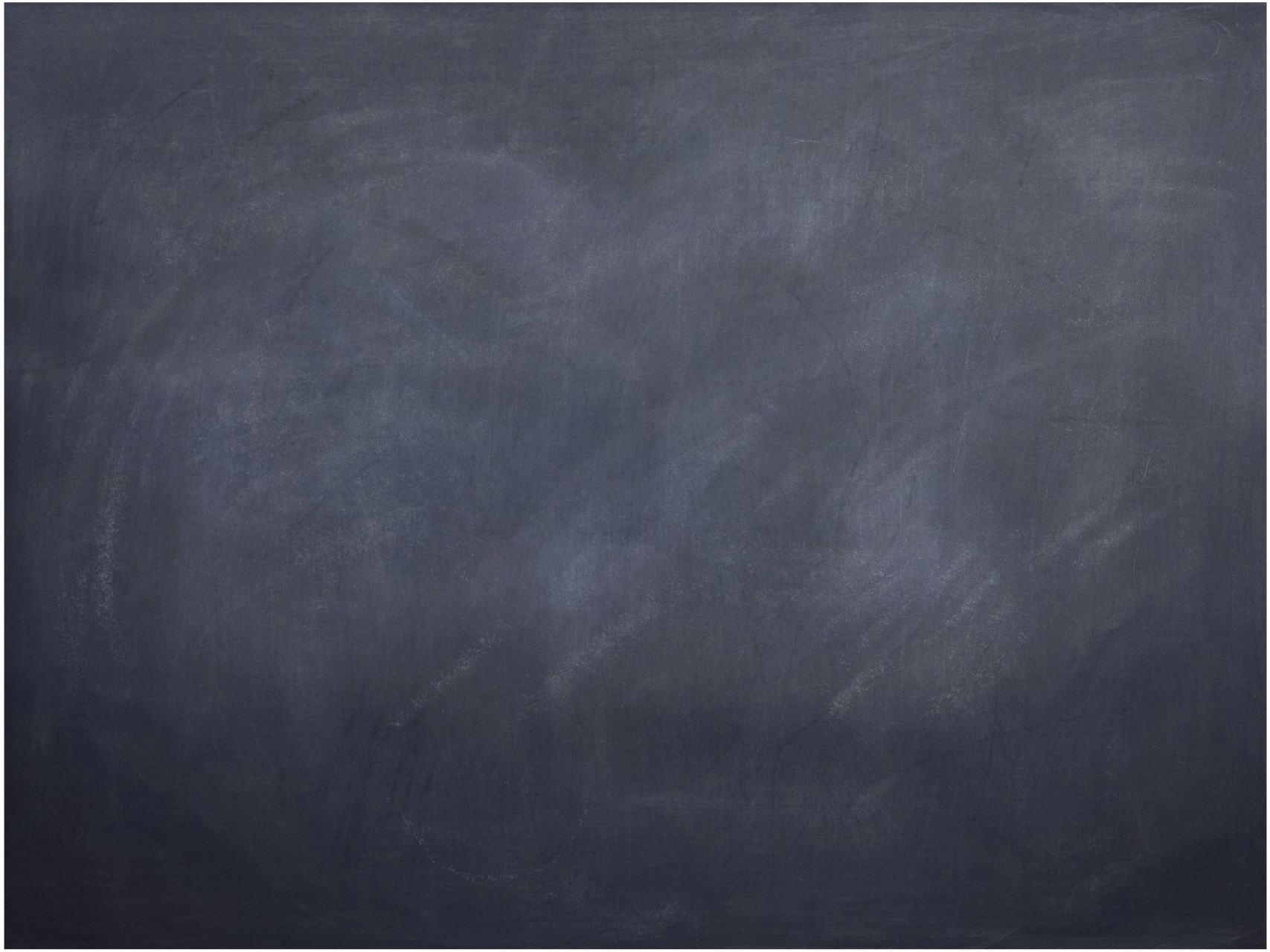





−Q

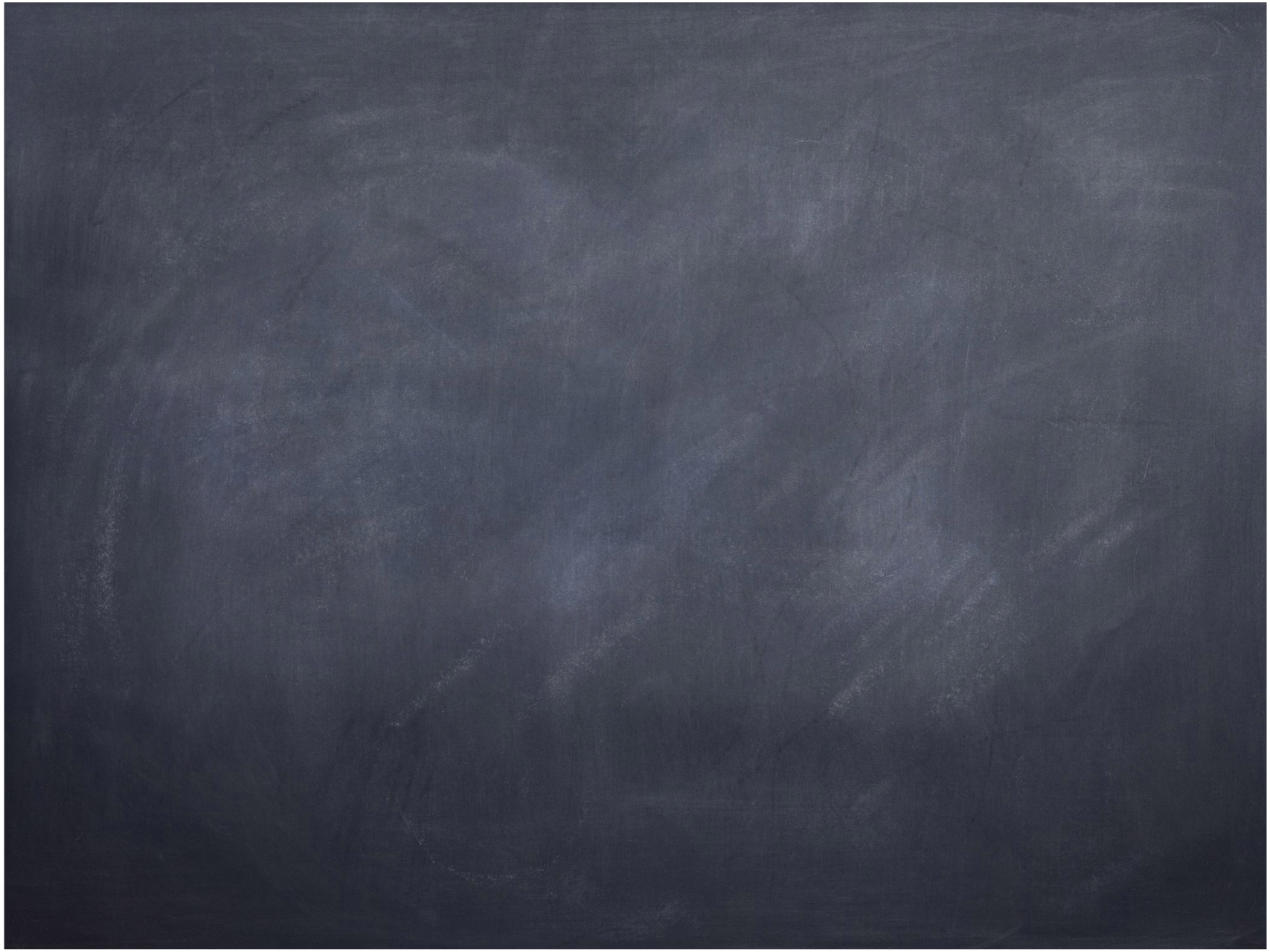

+Q

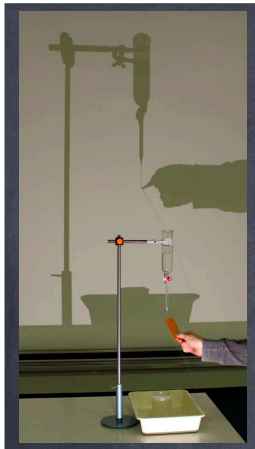

collecting comb
metal sphere
conveyor belt
charged comb
voltage
Academy Artworks



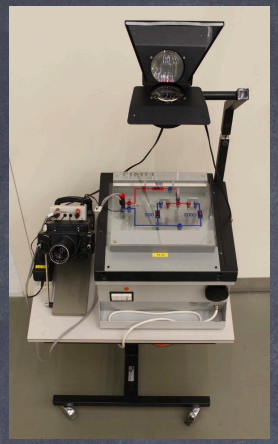
Skyguide Lägern Radar:

provides airplane navigation in the hills between Dielsdorf & Baden





ES43



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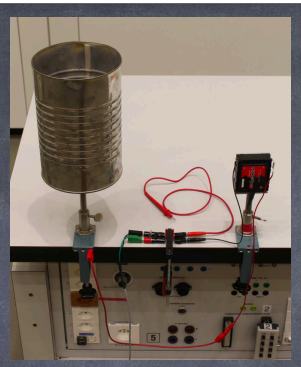
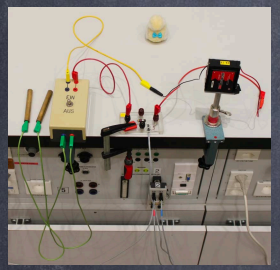


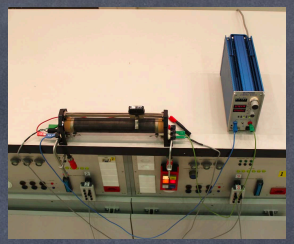
ES12

ES28

ES20



ES70



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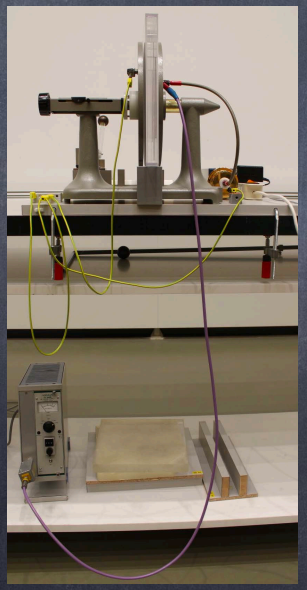

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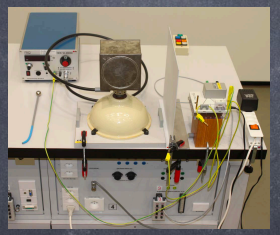
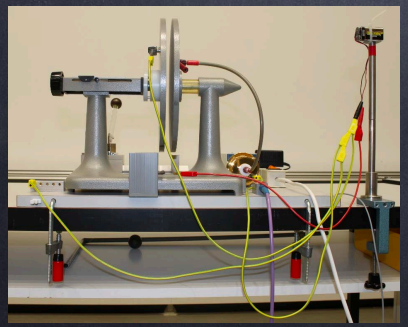
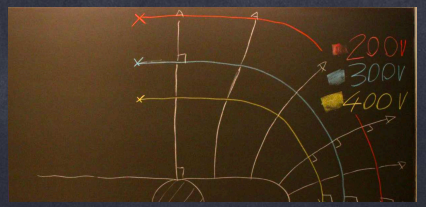


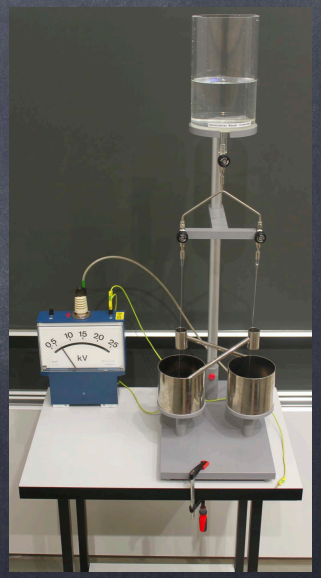
ES14



ES34



ES10



ES25