

Atmosférická elektřina

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Co nás nyní čeká



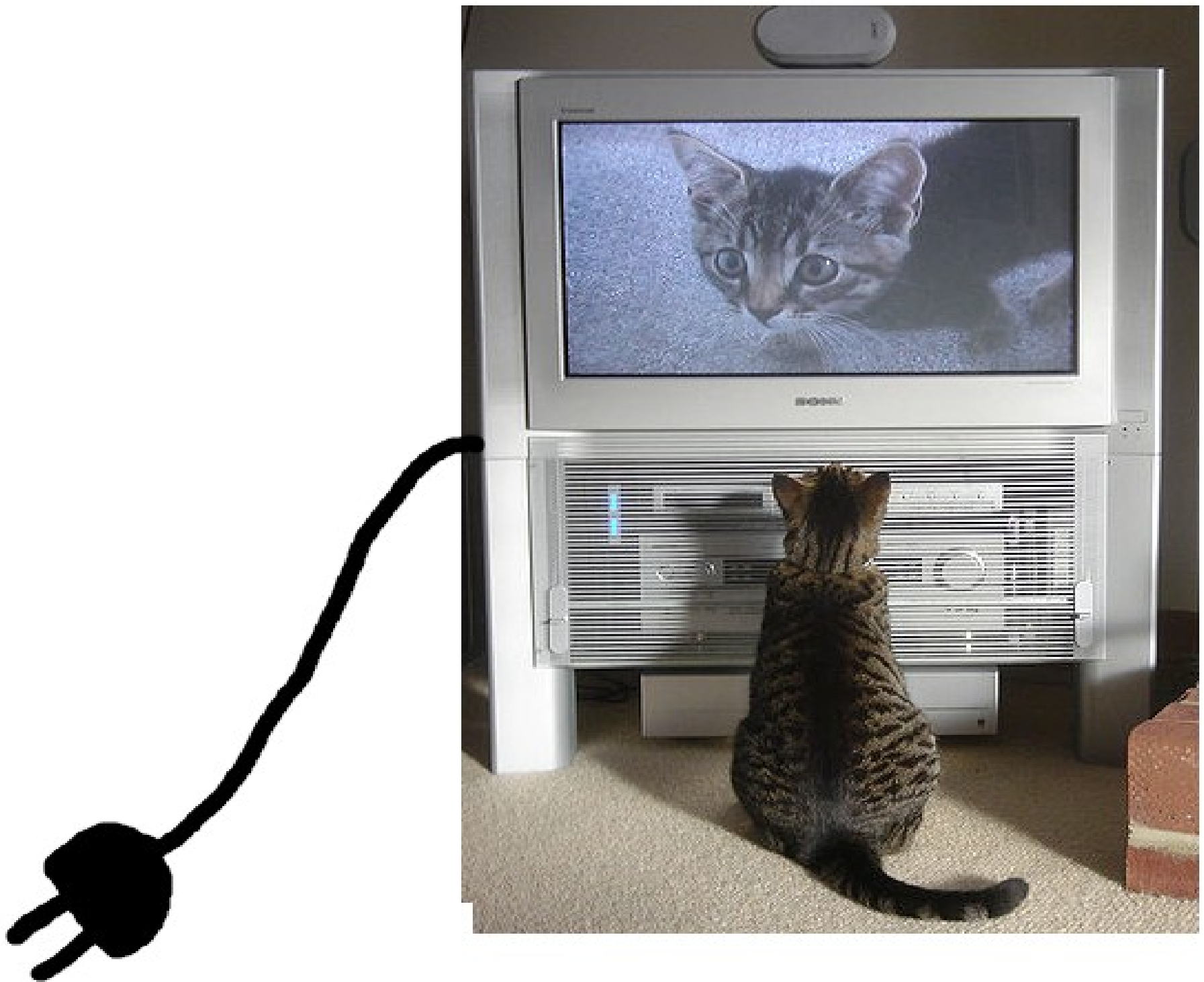
$$\Delta\phi = \frac{2Ur_0}{r^3} \frac{\omega}{\omega_0} (3 \cos^2 \theta - 1) - \frac{1}{\sigma(r)} \frac{\partial\sigma(r)}{\partial r} \left(\frac{\partial\phi}{\partial r} + \frac{Ur_0 \sin^2 \theta}{r^2} \frac{\omega}{\omega_0} \right),$$

Otázky k zodpovězení

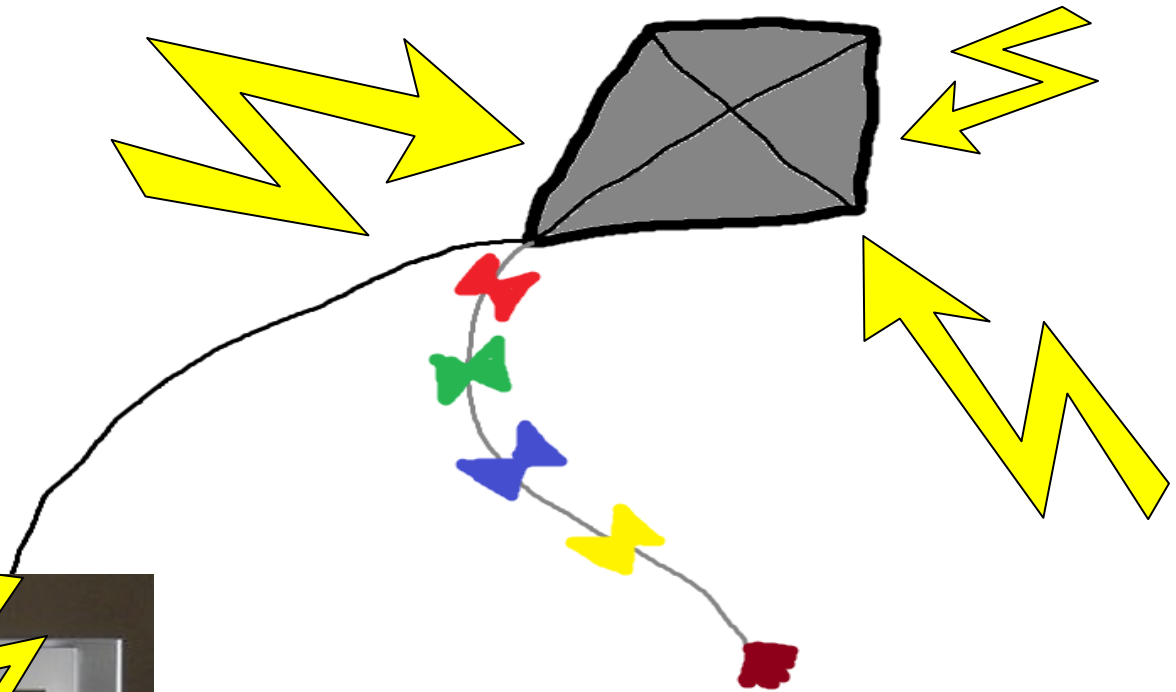
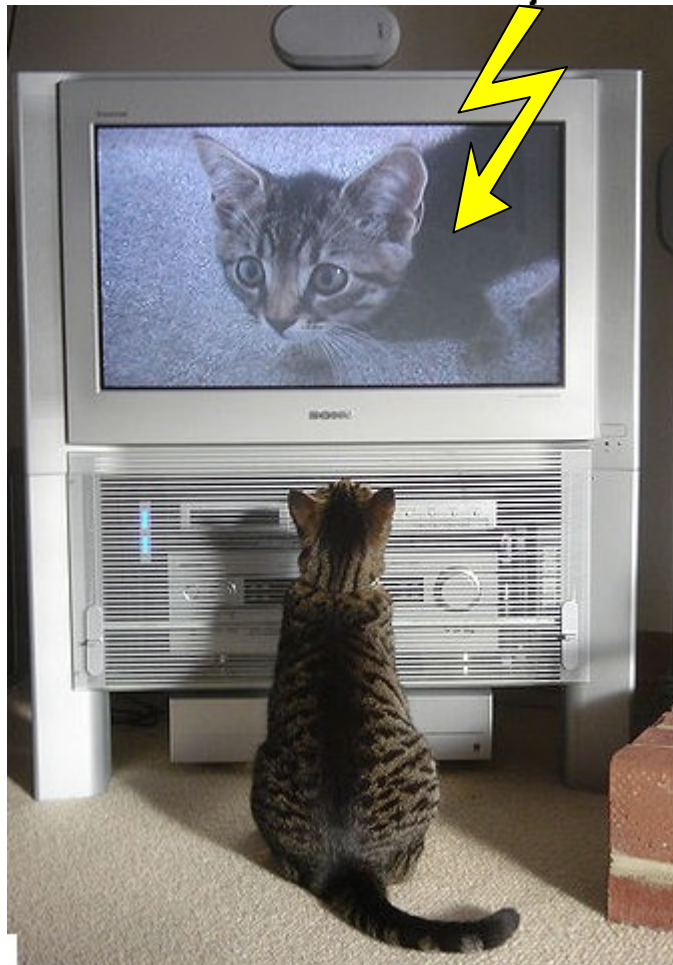
- Proč toto téma?
 - Jak jí získat?
- Co na ní říkáme my vědci?
 - Jak se měří?
 - A co my?

Atmosférická elektřina

Proč toto téma?







Atmosférická elektřina

Jak jí získat?

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Science and Invention

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February, 1922
No. 10

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Power from the Air

DURING the War there was developed in Germany a new art—or science—that bids fair to revolutionize our present means of obtaining power.

This art, which is as new now as wireless was twenty-five years ago, will attain proportions during the next twenty years that may appear fantastic to-day. The inventor of the new science, an engineer of note, Herr Hermann Plauson, has devoted years of labor to his researches and he has now actually in use small power plants, that generate electricity direct from the air, day and night, without interruption at practically no cost, once the plant is constructed.

We had occasion, in one of our former issues, to describe the system, roughly, from cabled dispatches, but complete information is available now. The amount of electrical power that resides in our atmosphere is astounding. Herr Plauson found in his experiments that a single balloon sent aloft to a height of 300 yards gave a constant current at 400 volts of 1.8 amperes, or in 24 hours over $17\frac{1}{4}$ kilowatts! By using two balloons in connection with a special condenser battery, the power obtained was $81\frac{1}{2}$ kilowatts in 24 hours! The actual current delivered was 6.8 amperes at 500 volts.

The best balloons used by the inventor are made of thin aluminum leaf. No fabric is used. A simple internal system of ribs, stays and wires, give the balloon rigidity as well as a certain amount of elasticity. The balloon, when made airtight, is filled with hydrogen or better, with helium. It will then stay aloft for weeks at a time. The outer surface is dotted with extremely sharp pins, made sharp electrolytically. Ordinary pins did not prove good current collectors, as they lacked extreme sharpness. The pins themselves were made from amalgamated zinc, containing a radium preparation, in order to ionize the air. It was also found that by dotting the outer surface of the balloon with zinc-

amalgam more current could be collected. Even better results were obtained with polonium-amalgam. Plauson states that the function of these amalgams is purely photoelectric.

One hundred of such captive balloons, separated one hundred yards from each other, will give a steady yield of 200 horse power. This is the minimum, because in the winter this figure increases up to 400 horse power, due to the higher electrification of the atmosphere.

We need not go into the technic of how the current is finally made useable for industrial purposes, suffice it to say that the problem has been entirely solved by Herr Plauson. By using batteries of condensers, high tension transformers, etc., the current can be transformed to any form desired, such as for lighting lamps, running motors, charging storage batteries, etc.

Plauson also invented a sort of electrostatic rotary transformer which gives alternating current without the use of condensers and transformers. Indeed, its output is very great, as it actually "sucks" the current down rapidly from the collector balloons. There is no doubt that this invention will soon come into universal use all over the world. We will see the land dotted with the captive balloons, particularly in the country and wherever water power does not abound. Indeed, the time is not distant when nearly all of our power will be derived from the atmosphere. So far it seems to be the cheapest form of power known, it being much cheaper than even water power—the cheapest form of power known to-day.

Not only that, but as the inventor points out, no devastating thunder storms occur near such aerial power plants, because the balloons act not only as lightning arresters, but they quickly discharge the biggest thunder cloud, safely and noiselessly through their grounded spark gaps.

H. GERNSBACK.

Herr Hermann Plauson,

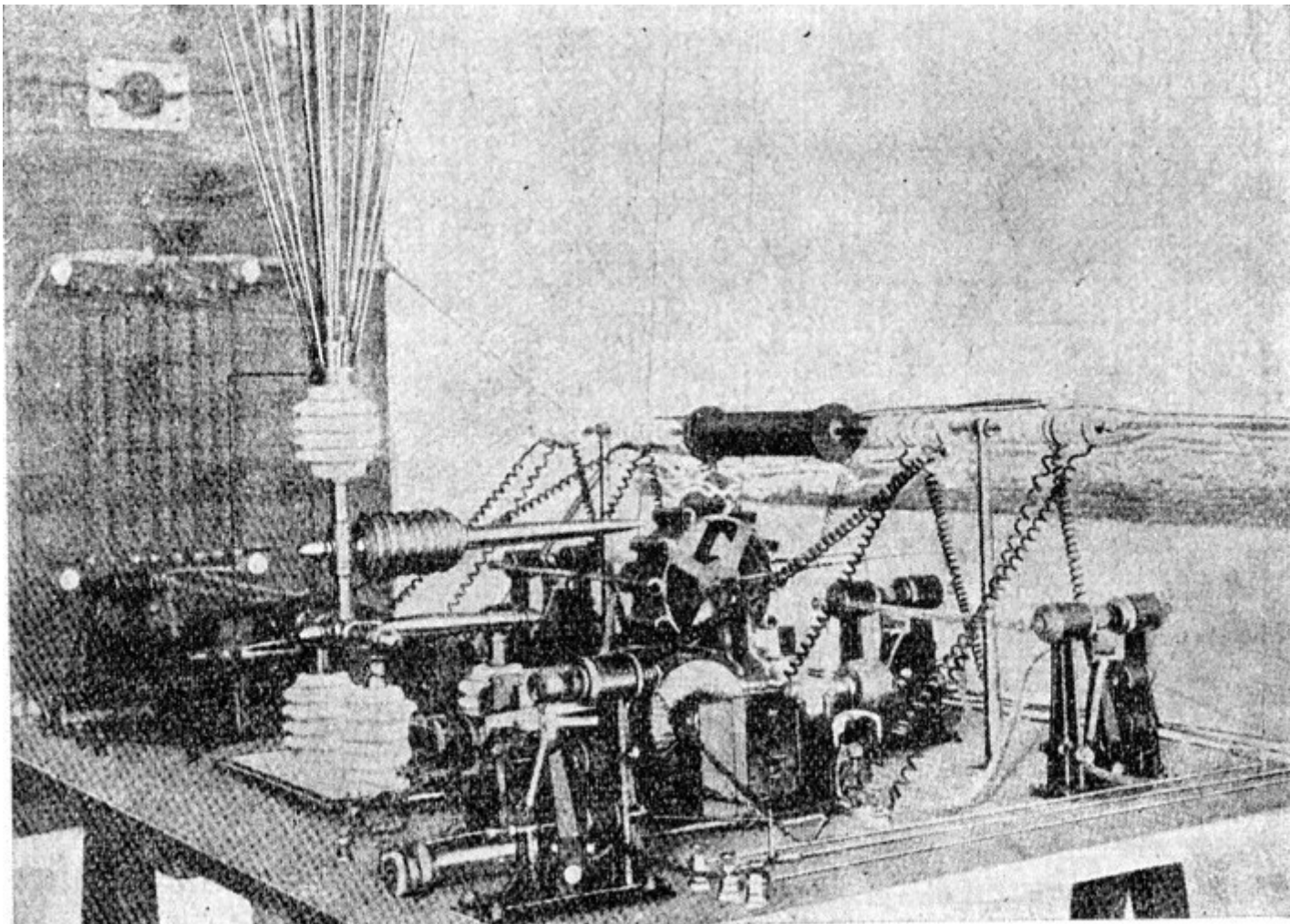
small power plants, that generate electricity direct from the air, day and night, without interruption at practically no cost, once the plant is constructed.

single balloon 300 yards 400 volts of 1.8 amperes
(274 m)

in 24 hours over $17\frac{1}{4}$ kilowatts!

There is no doubt

that this invention will soon come into universal use
it seems to be the cheapest form of power known



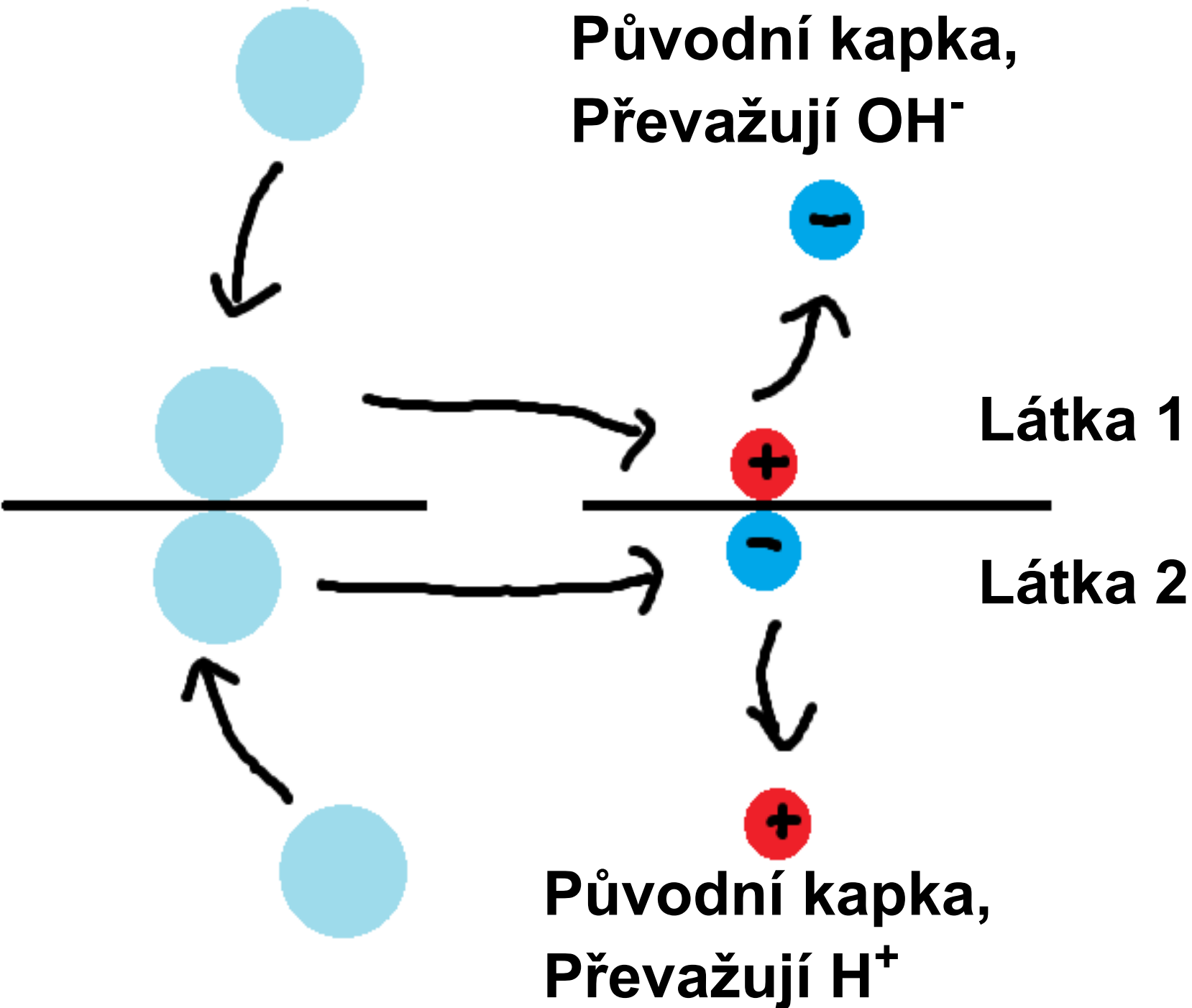
„The Guillot device generated about **2.5-3 Kilowatts** with antenna height of ~ **20 meters**. Power depends on the total collector surface and height of the vertical antenna. The apparatus **in the photo** produced ~**300 watts** with a collector **2 meters tall**.“

Fernando Galembeck
+
tým

brazilská
Univerzita de Campinas

Kapka vody

**Původní kapka,
Převažují OH^-**

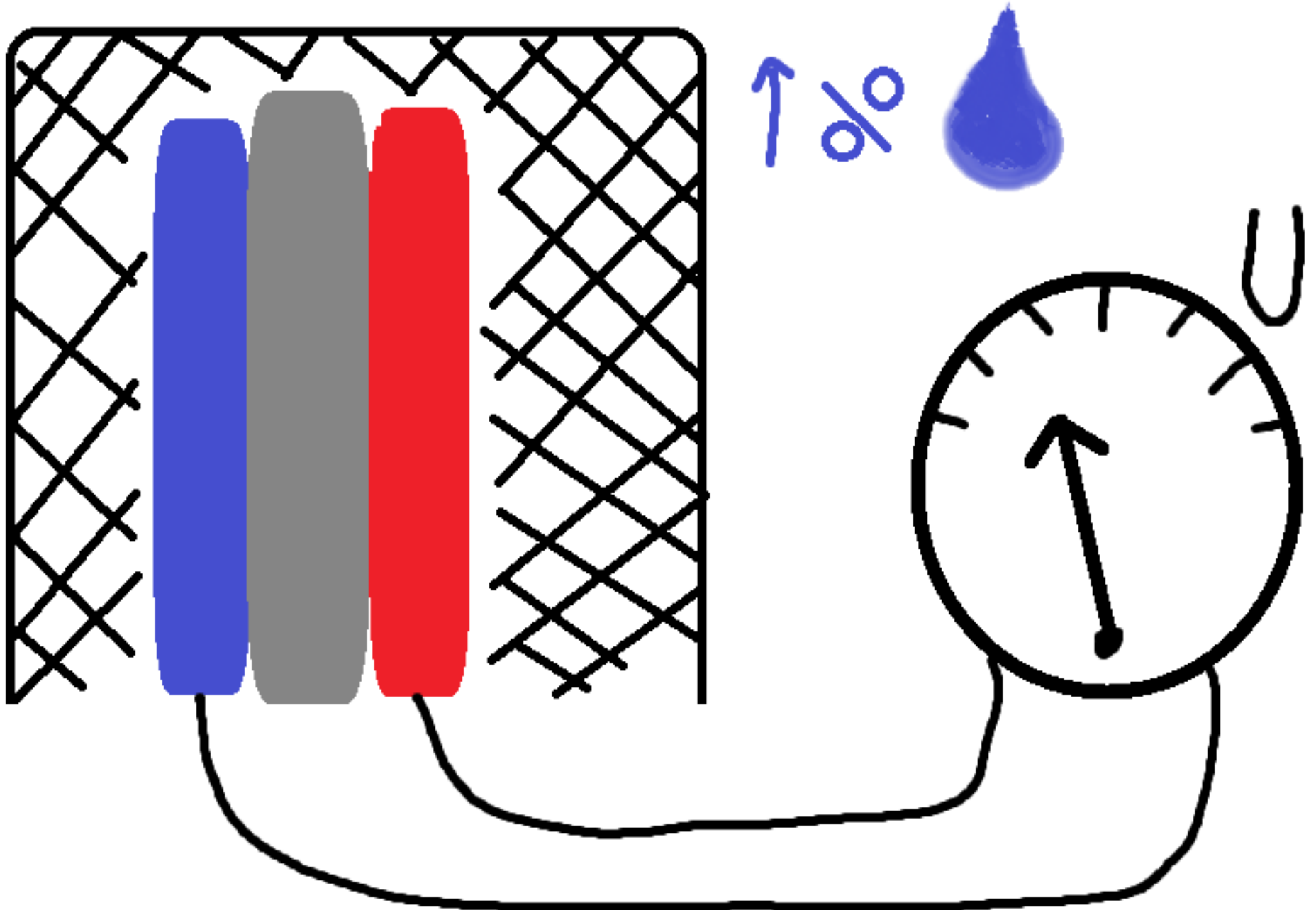


Látka 1

Látka 2

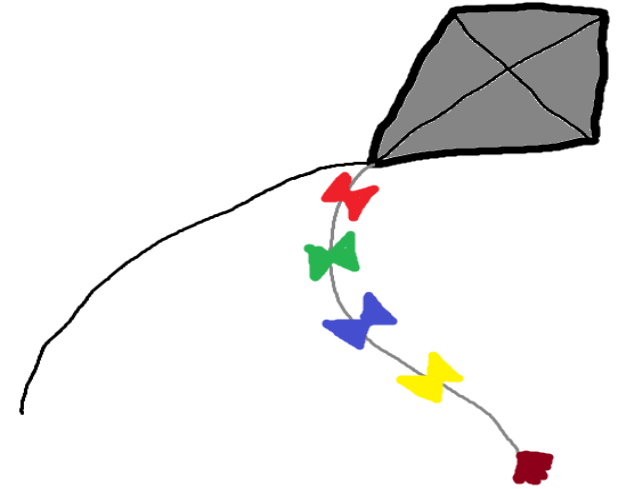
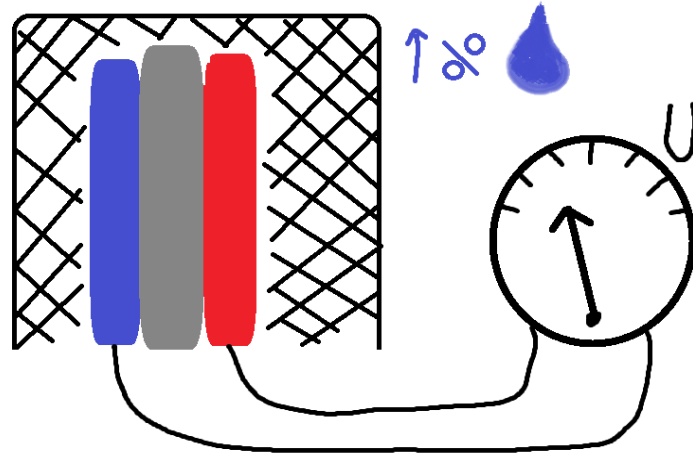
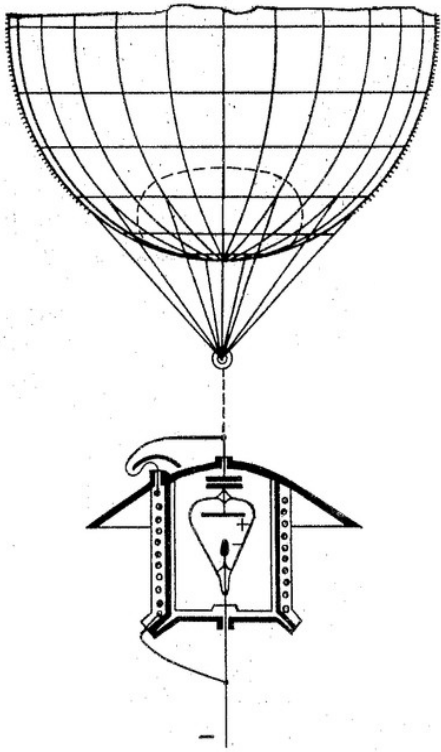
**Původní kapka,
Převažují H^+**

Galembekův vlhkoelektročlánek



Atmosférická elektřina

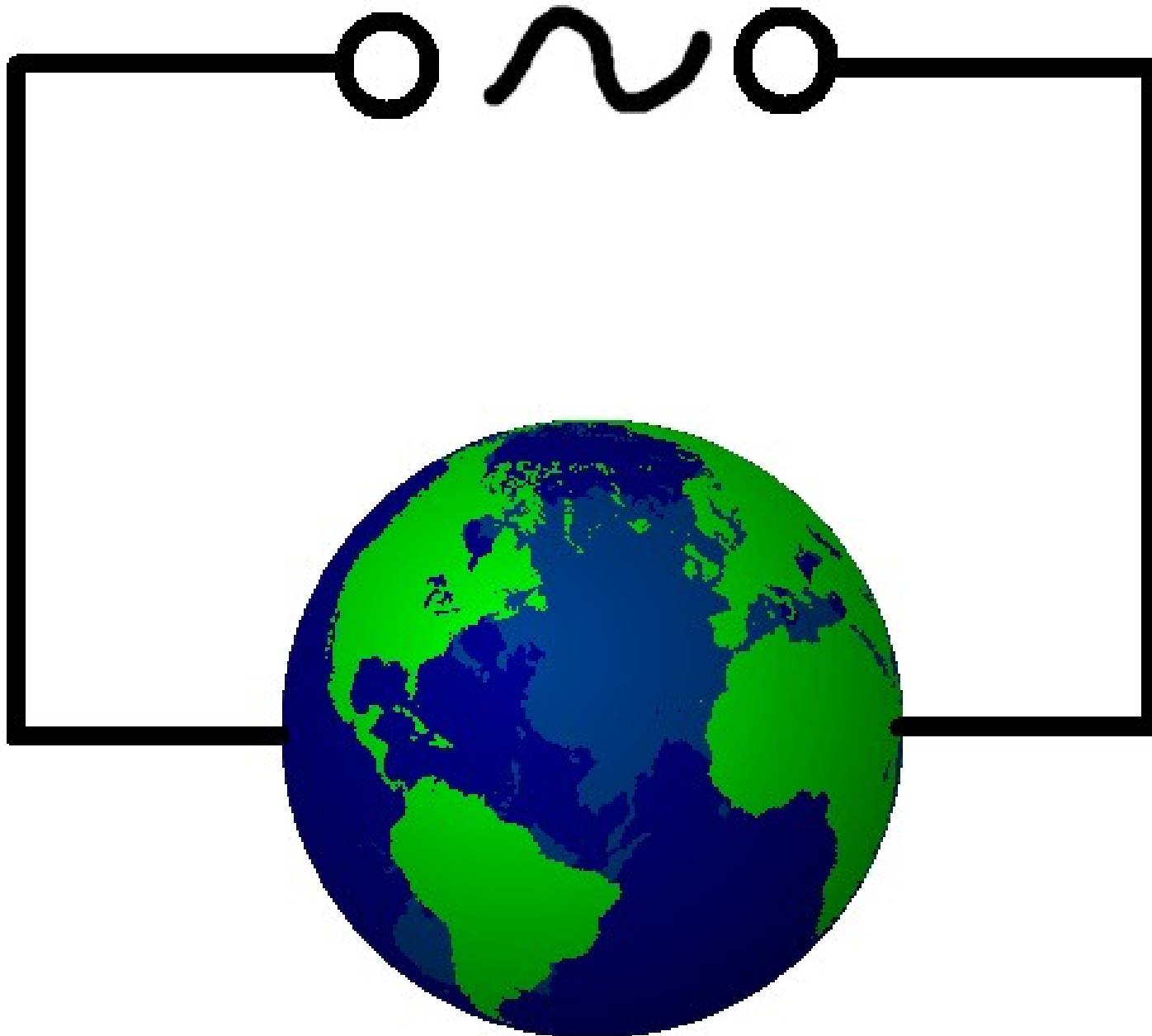
Shrnutí...



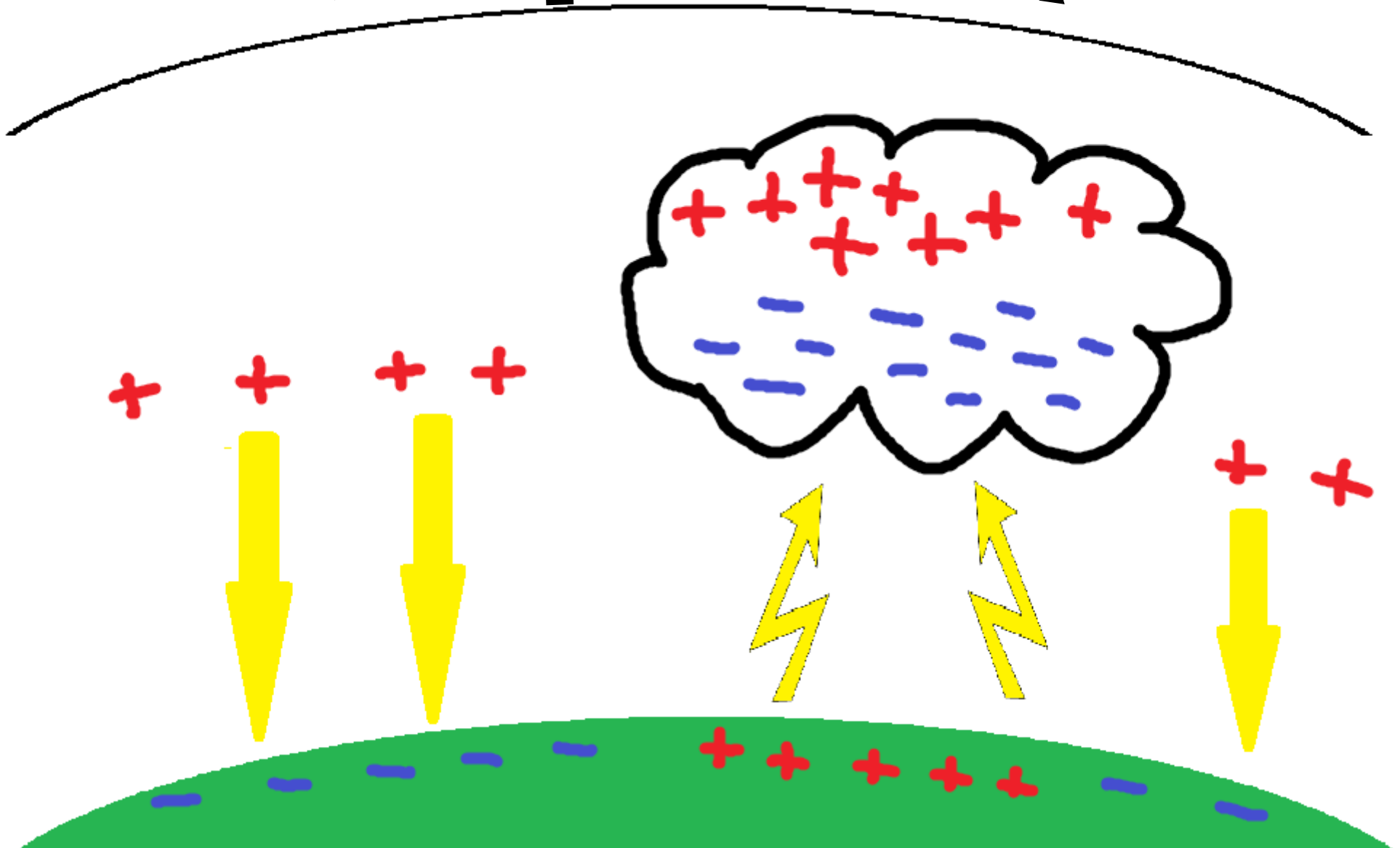
- Plauson – 700W / balón
- Gulliot – 20 m anténa / 2,5 kW
- Galembeck - hygroelektřina

**Co na ní
říkáme my
vědci?**

Zemský elektrický obvod



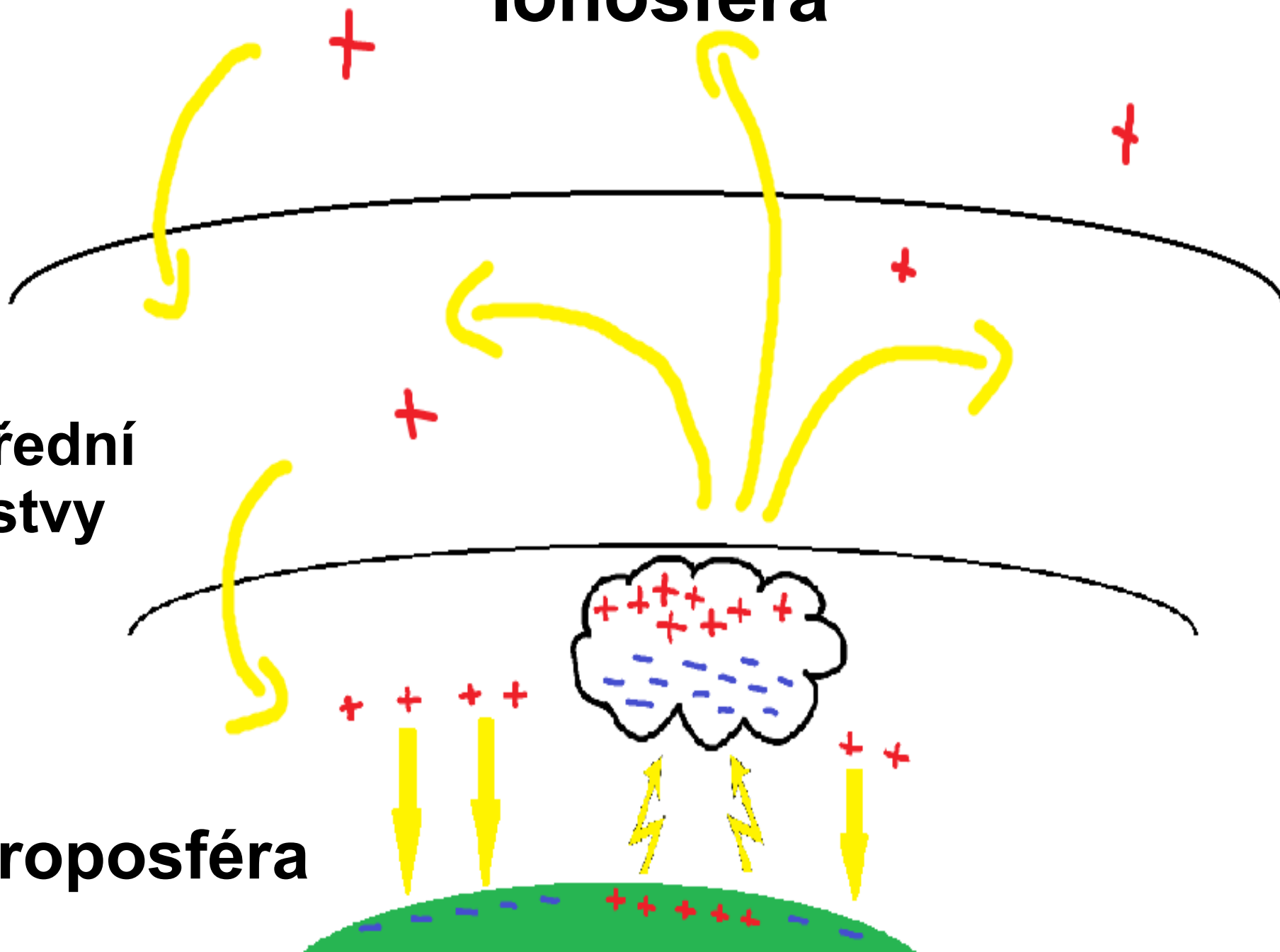
Troposféra



Ionosféra

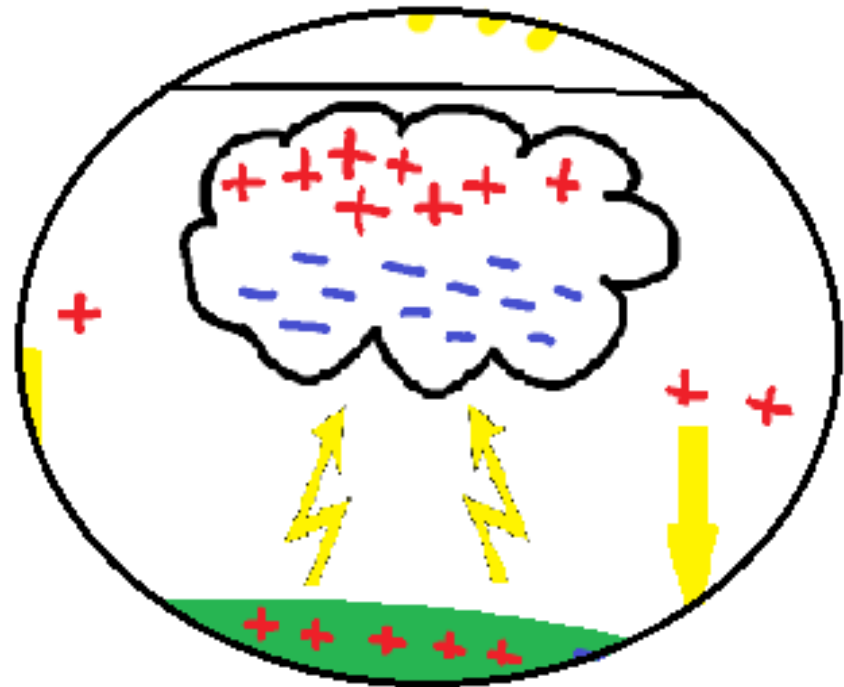
Střední
vrstvy

Troposféra



Zdroj zemského obvodu

- Bouřkové a silně nabité mraky.
- Záporný náboj na spodku mraku musí být větší, než ten na zemském povrchu.
- Proč se tak ale děje?



Dělení náboje v mraku

Wilsonova teorie

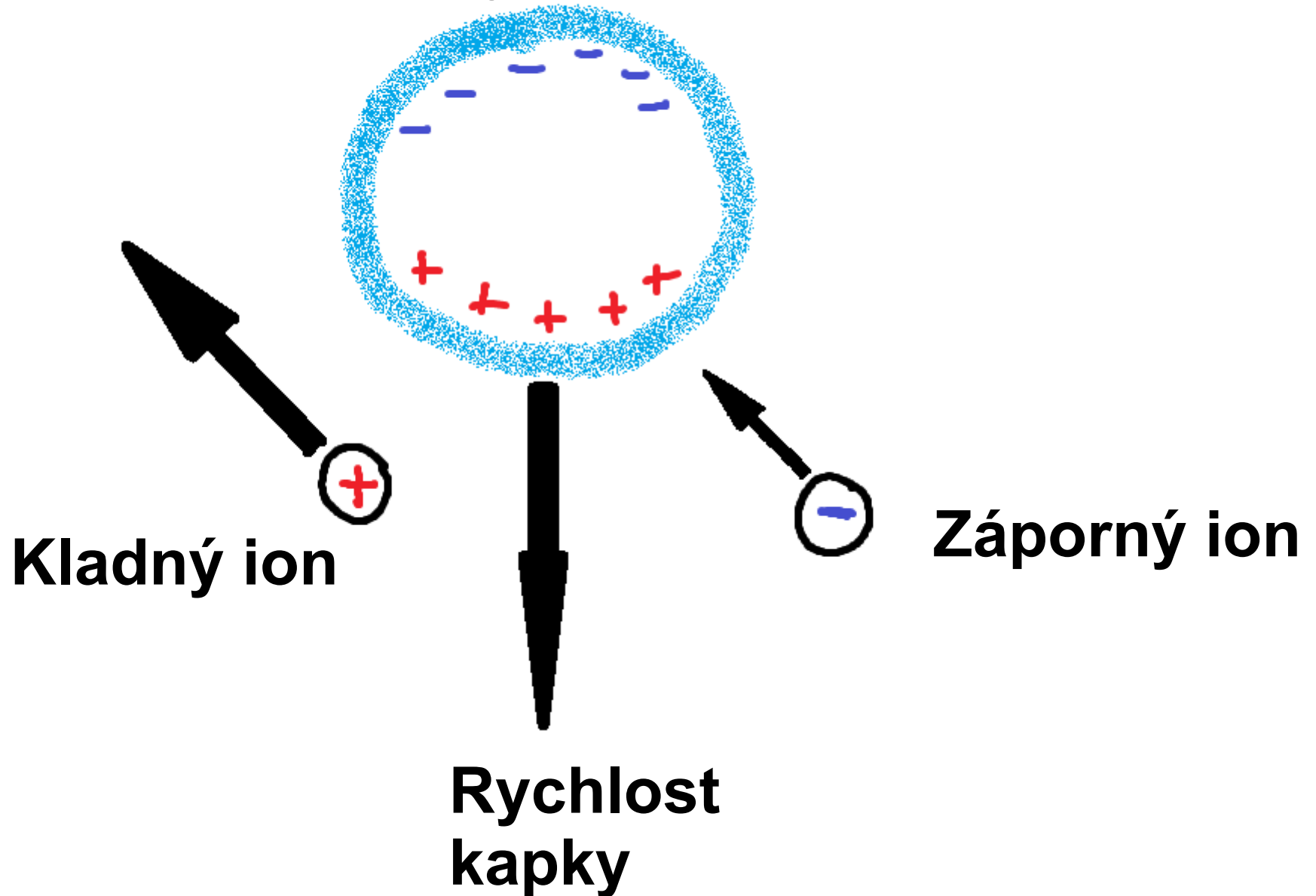
- Kapky vody s sebou unášejí náboj

Wallova teorie

- Náboj se tvoří na malých kouscích ledu

Wilsonova teorie

Padající kapka

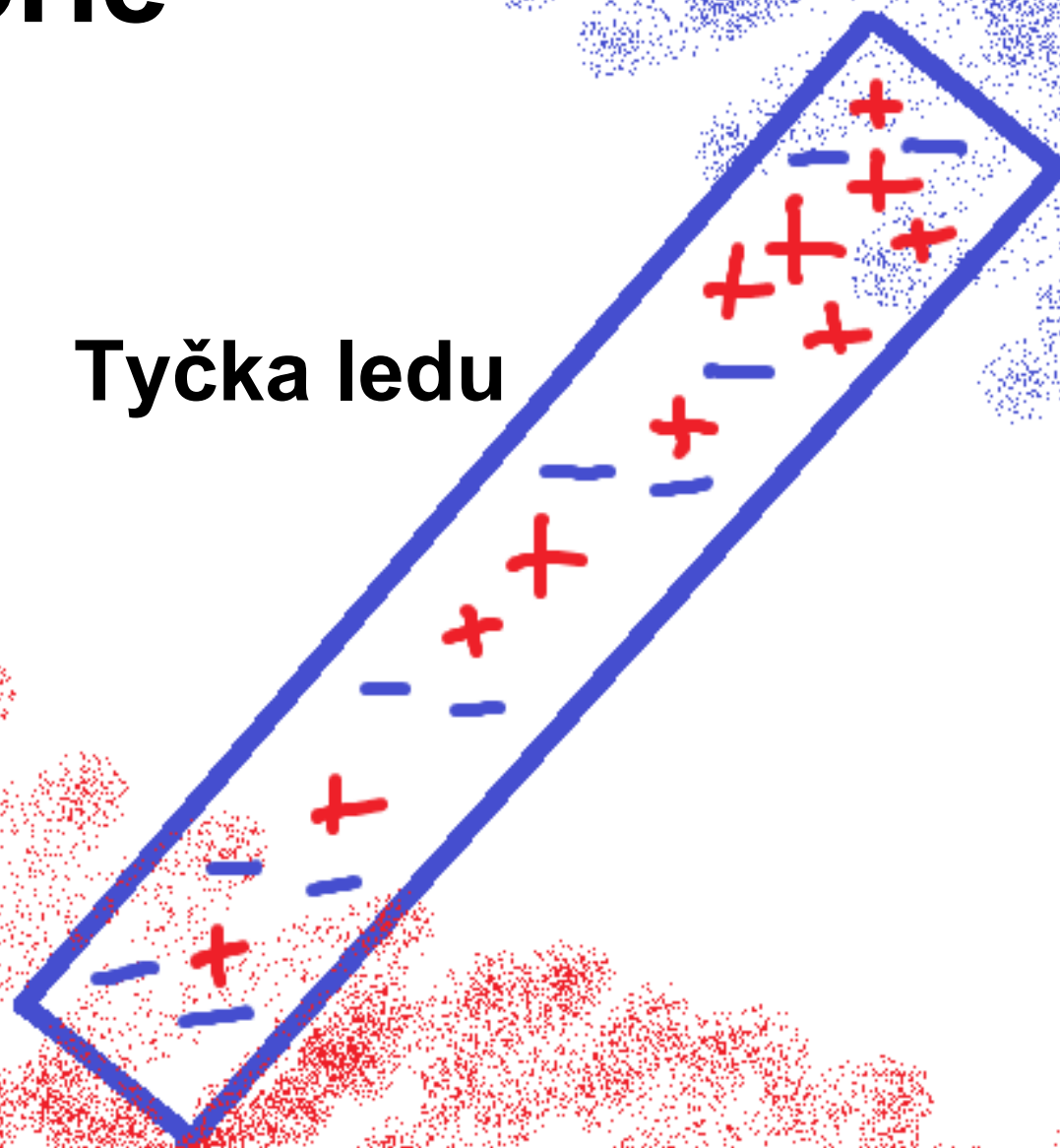


Wallova teorie

Chlad

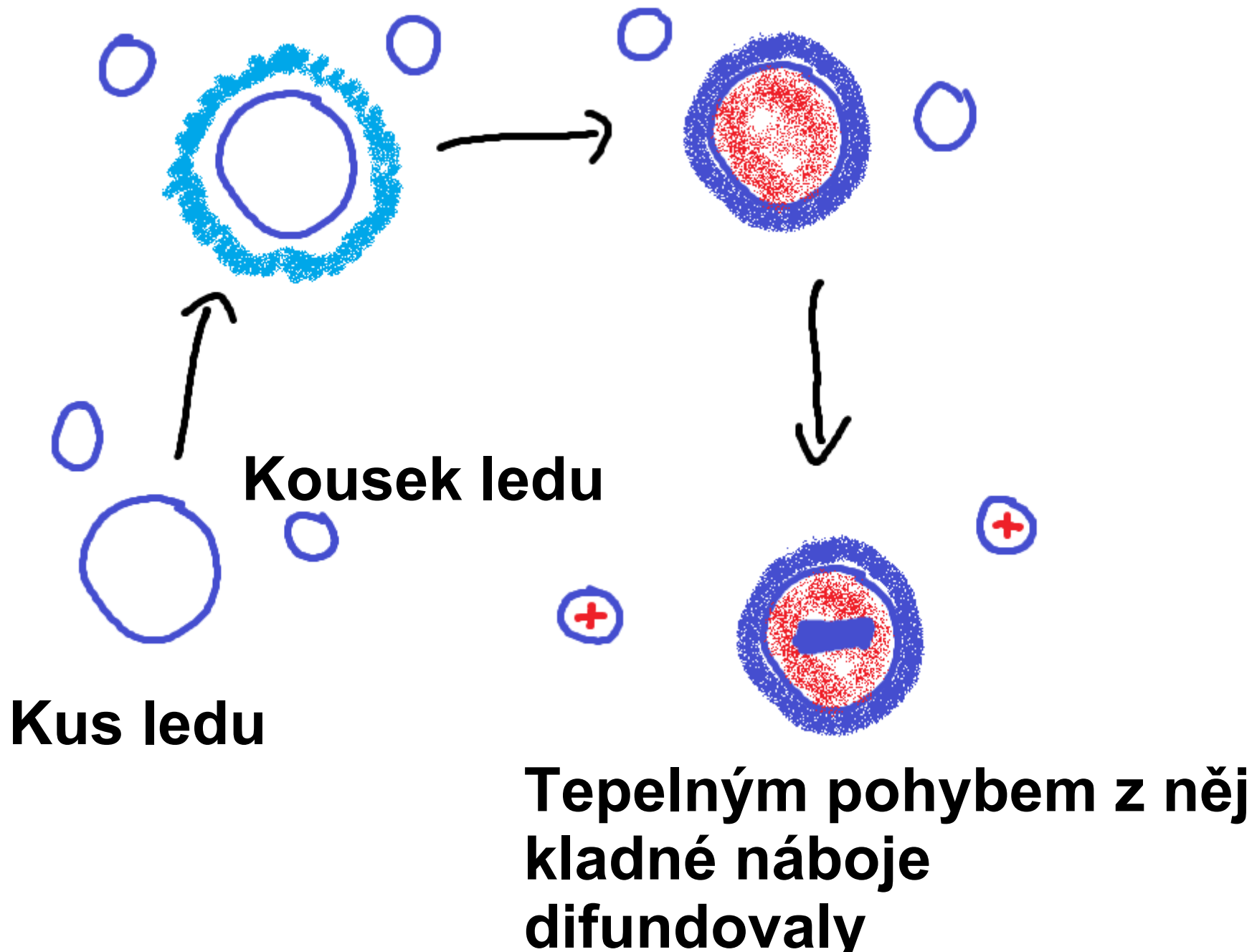
Tyčka ledu

Teplo



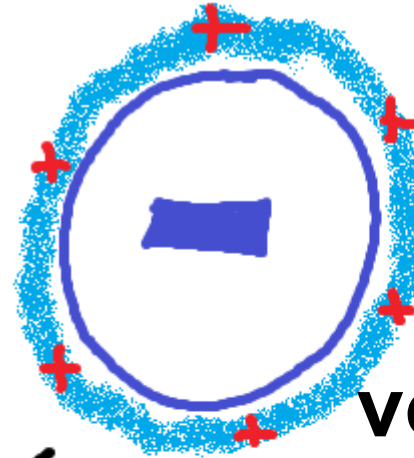
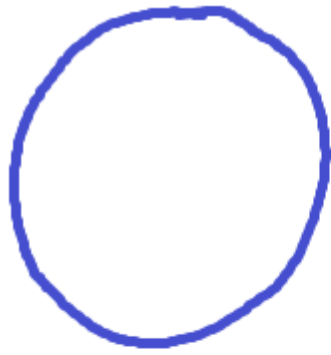
**Narazil na
podchlazenou vodu**

**Ta svým zmrznutím
ohřála kus ledu**

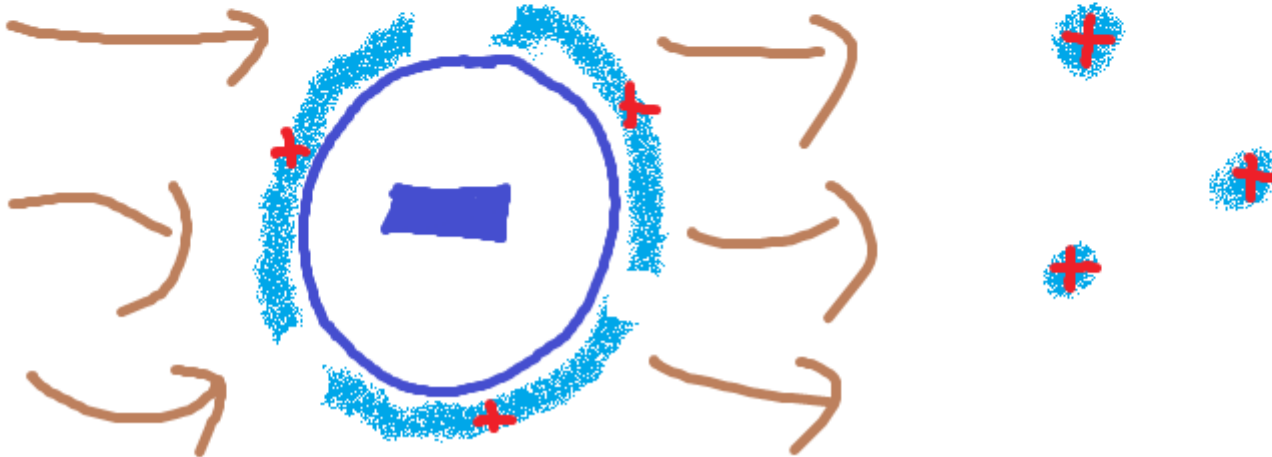


Kus ledu

Obalil se podchlazenou vodou

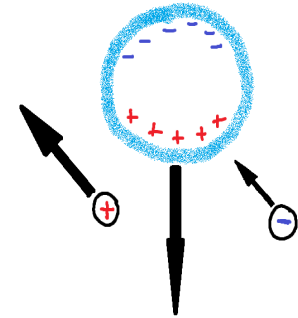
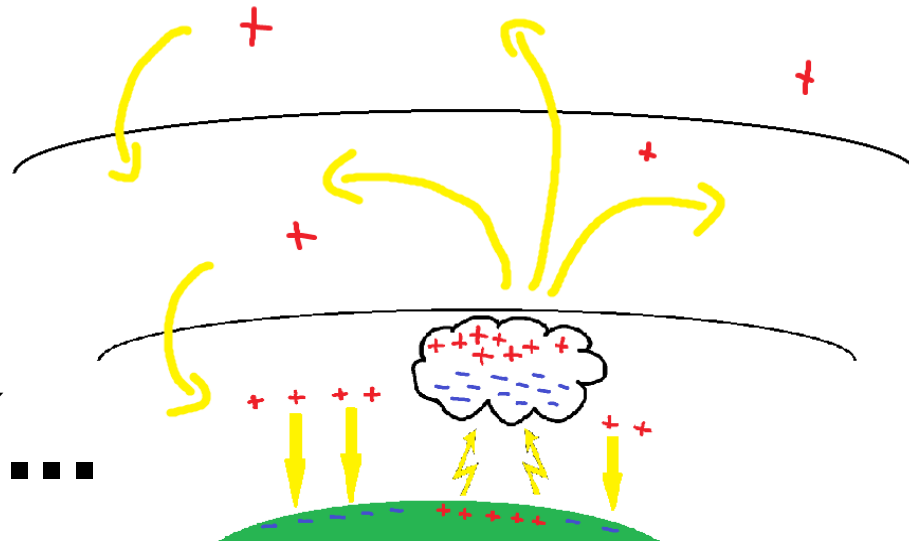
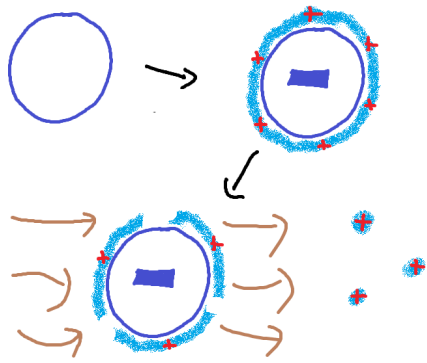


Podchlazená voda se nabíla



Turbulence vodu odcákly i s nábojem

Atmosférická elektřina



Shrnutí...

- Atmosféru nabíjí bouřky
- Teorie kapek sbírajících náboje
- Teorie elektrických vlastností ledu

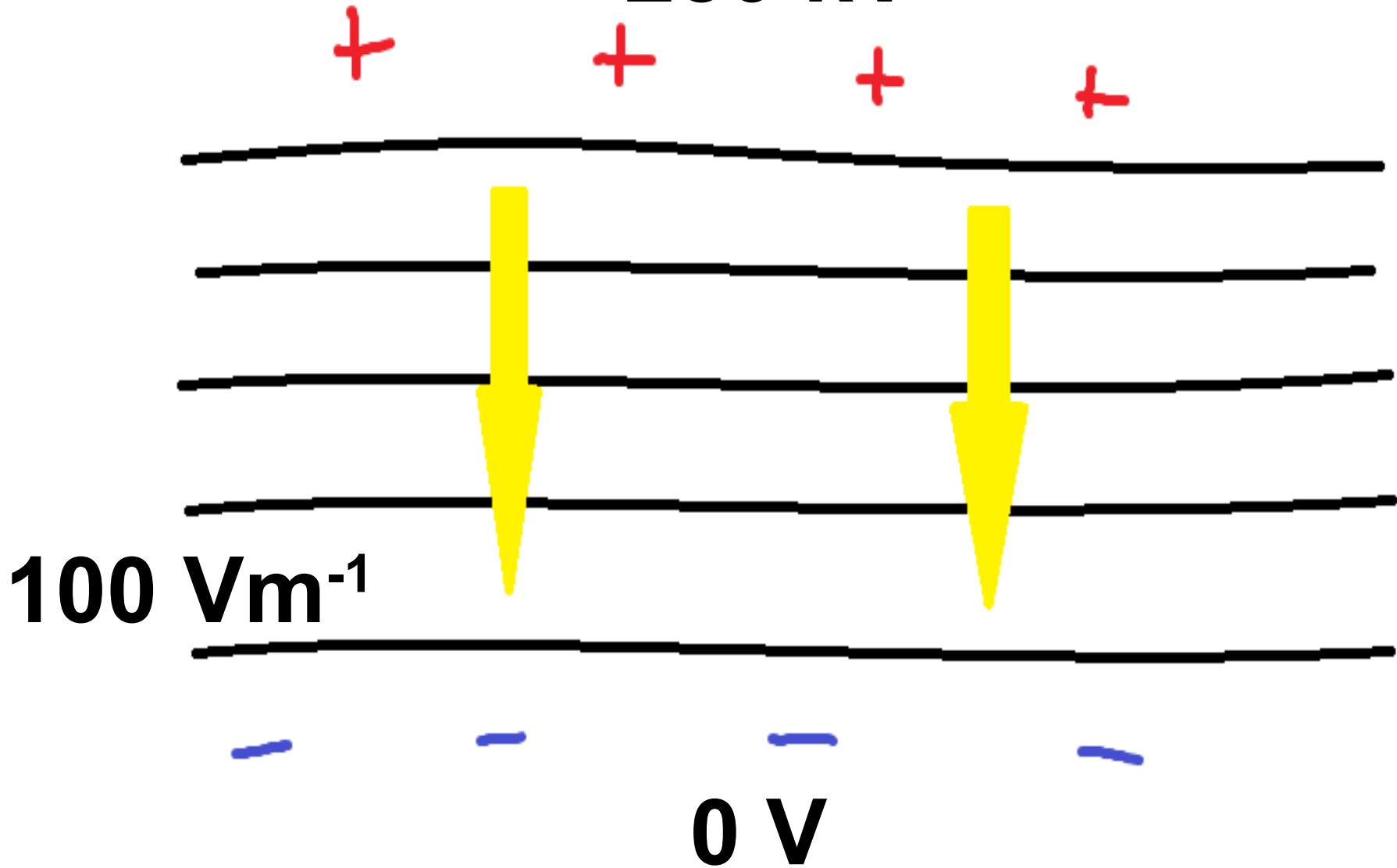
Jak se měří?

a

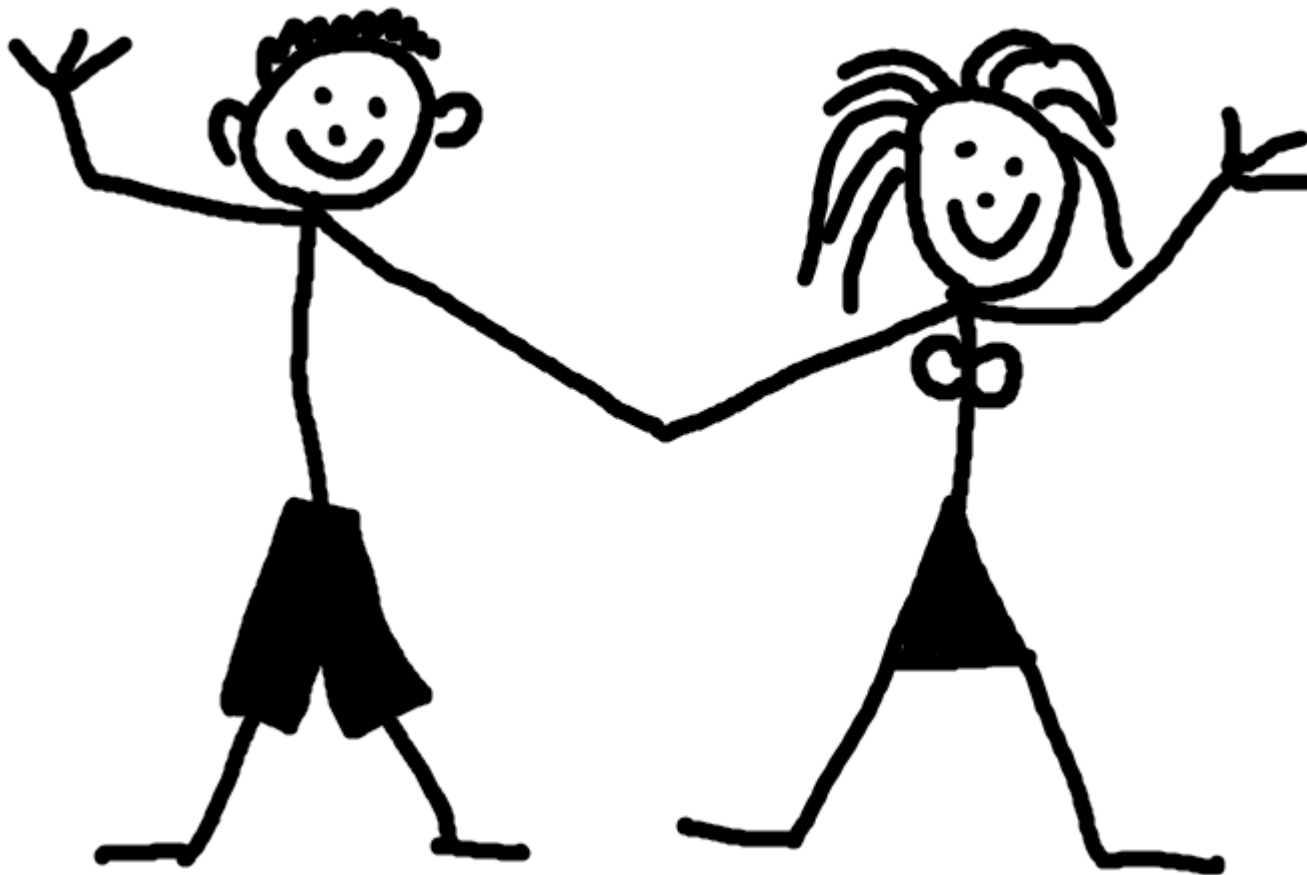
**Proč nás to vlastně
nezabije?**

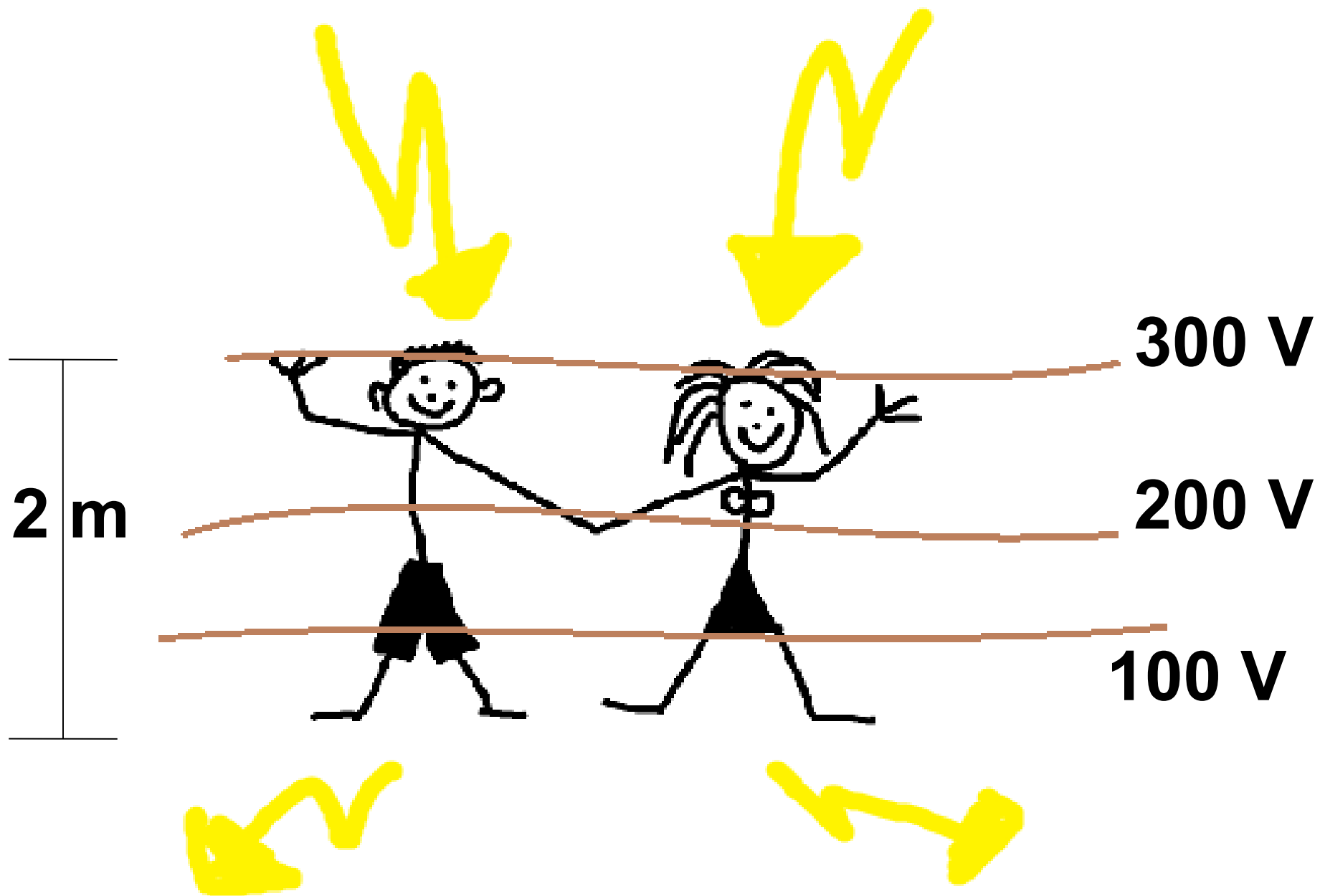
Profil elektrického pole

250 kV



Příklad





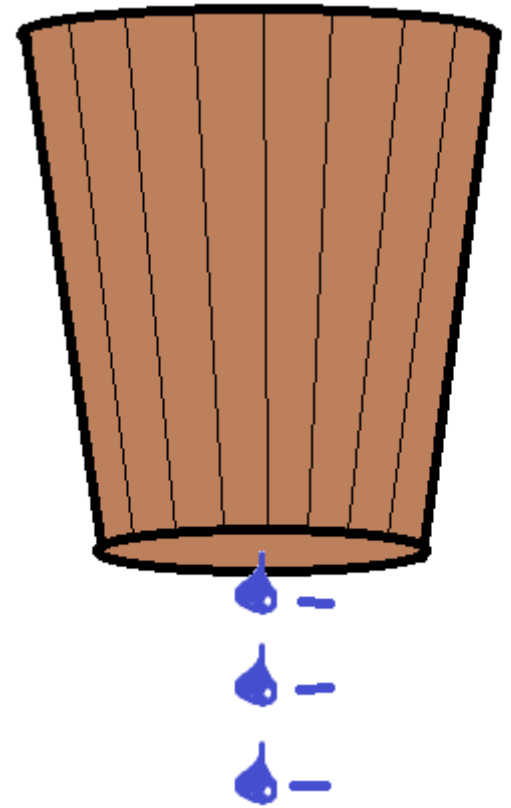
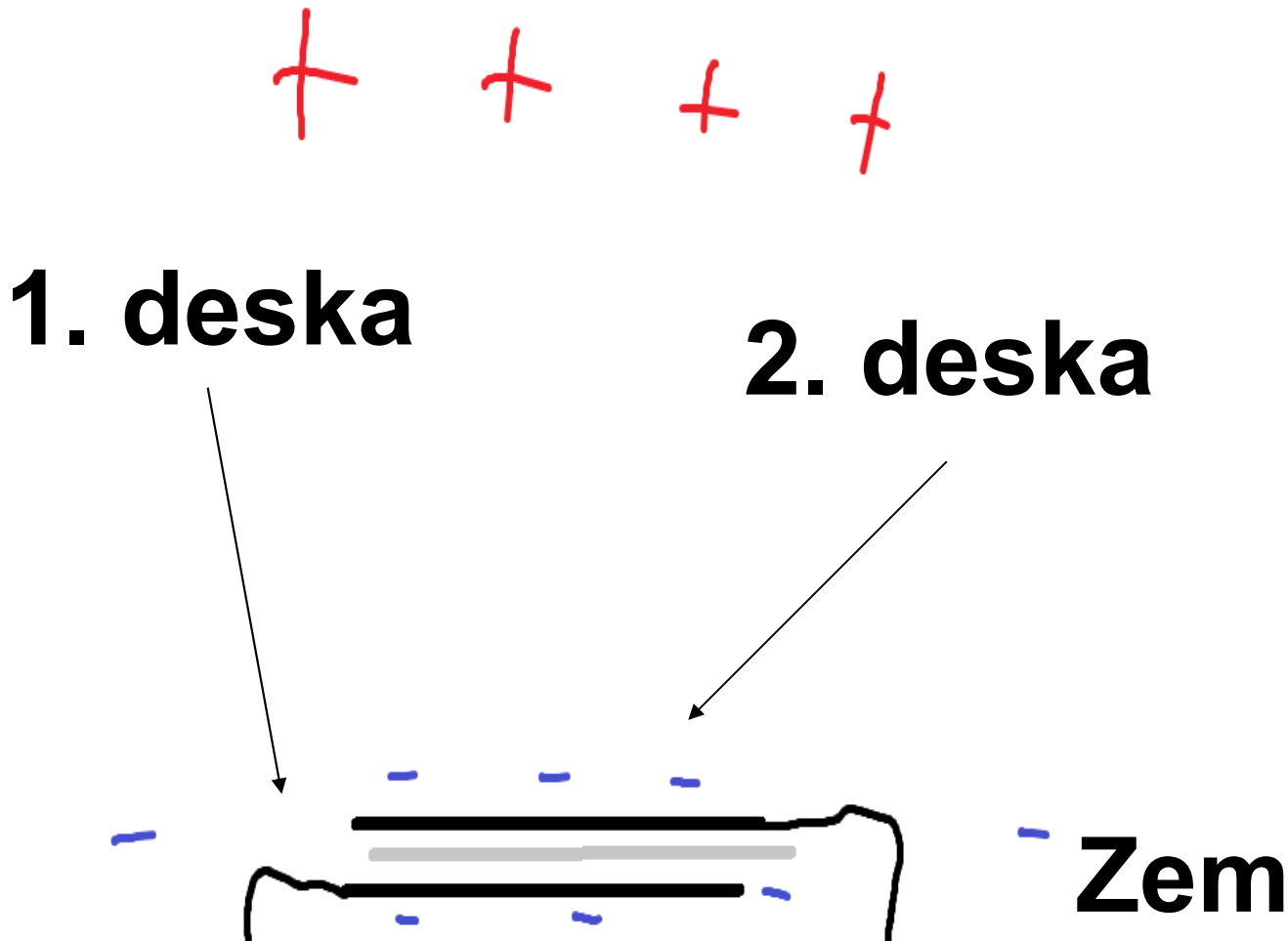


Nakonec to všechno dobře dopadlo

A proto...

- Se pole neměří ve městech
- Se pole neměří v lesích
- Se pole měří na polích
- Se měří hlavně v Antarktidě

Jak to dělá Feynman



Jak to dělají profíci

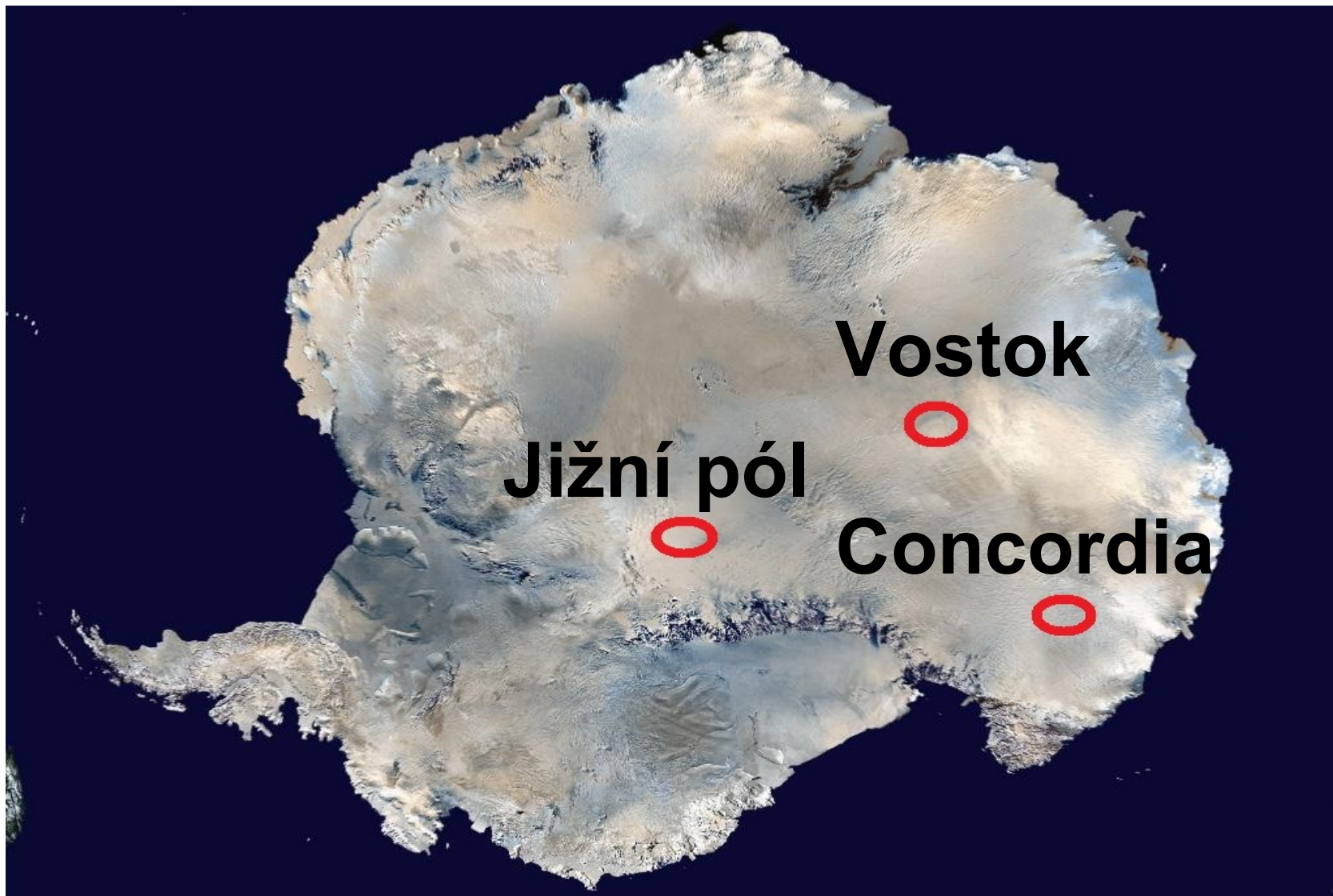
**Referenční
sonda /
zařízení**



**Pohyblivá
sonda /
zařízení**

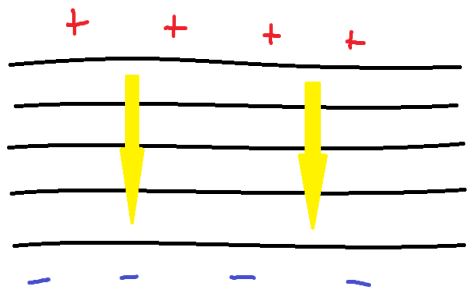
Zem

A kde se měří...



Atmosférická elektřina

Shrnutí...



- Atmosféra – kondenzátor
- Okolo vodivých objektů se pole vybije

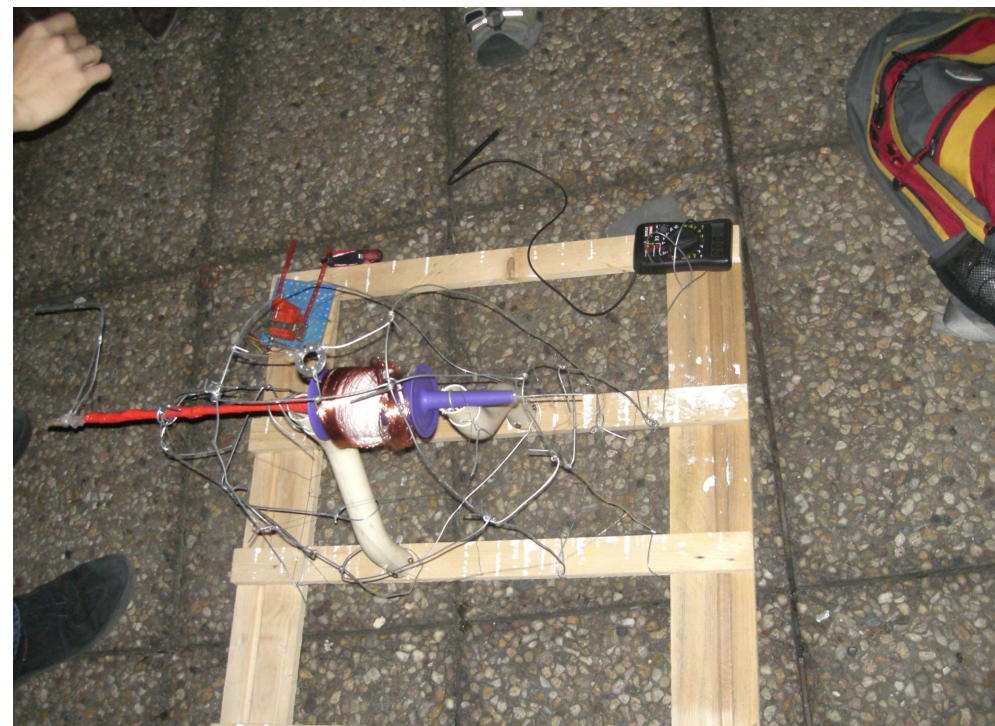


Atmosférická elektřina

A co my?

Pokus č. 1

Přístrojové vybavení



Příprava a vypouštění





**Balón u
právníků**

Pokus č. 3



Závěr

Děkujeme

Panu Ing. Vojtěchu Svobodovi

Filipovi a Janě

A vůbec neděkujeme počasí!!!

Zdroje

- 1) http://commons.wikimedia.org/wiki/File:Fatty_watching_himself_on_TV.jpg
- 2) http://upload.wikimedia.org/wikipedia/commons/1/18/Plauson_Node.png
- 3) <http://cs.wikipedia.org/wiki/Soubor:Globe.png>
- 4) <http://www.portal.cz/scripts/detail.php?id=2126>
- 5) <http://globalcircuit.phys.uh.edu/>
- 6) <http://pubs.acs.org/doi/full/10.1021/la102494k>
- 7) http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_ARTICLEMAIN&node_id=222&content_id=CNBP_025407&use_sec=true&sec_url_var=region1&__uuid=1ccdb9b4-5221-40b7-bdfc-6054598361b4
- 8) <http://www.rexresearch.com/guillot/guillot.htm>
- 9) <http://www.nuenergy.org/alt/GernsbackOnPlausonFebruary1922.htm>
- 10) <http://www.rexresearch.com/plauson/plauson.htm>
- 11) **PLASMASPHERE ROTATION AND THE NATURE OF THE ATMOSPHERIC ELECTRICITY. PLANETARY ELECTRIC GENERATOR WITH THE ALTITUDE VARIATION OF THE ATMOSPHERIC CONDUCTIVITY** P. A. Bespalov, Yu. V. Chugunov and S. S. Davydenko Institute of Applied Physics, Russian Academy of Science, 46 Ulyanov Street, Nizhny Novgorod 603600, Russia
- 12) **On transient electric potential variations in a standing tree and atmospheric electricity** Jean-Louis Le Moue" I, Dominique Gibert, Jean-Paul Poirier Institut de physique du Globe de Paris, 4, place Jussieu, 75005 Paris, France
- 13) **Vertical profiles of electrical conductivity in the lowermost part of the turbulent boundary layer over flat ground** S. ISRAELSSON, E . KNUDSEN and S. V. ANISIMOV~ Department of Meteorology, Uppsala University, Box 516, S-751 20 Uppsala, Sweden; t Institute of the Physics of the Earth, B. Grouzinskaya, Moscow D-242, Russia