

Multimedia in Physics: Applets

Grzegorz Karwasz
Katedra Dydaktyki Fizyki
Instytut Fizyki, UMK Toruń

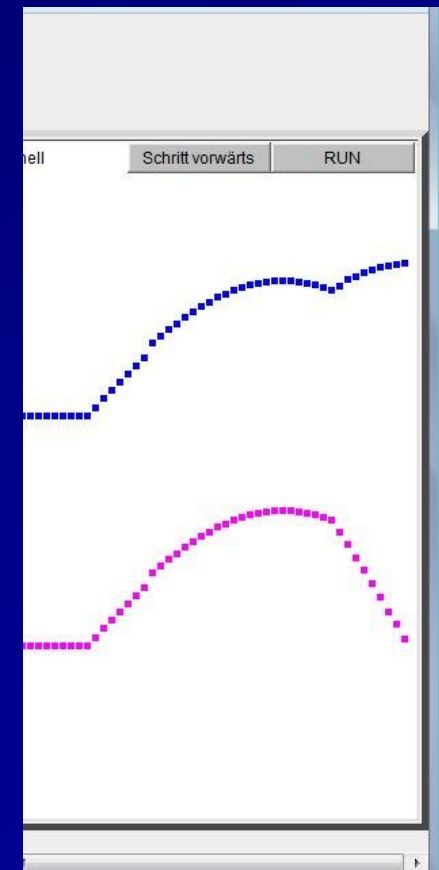
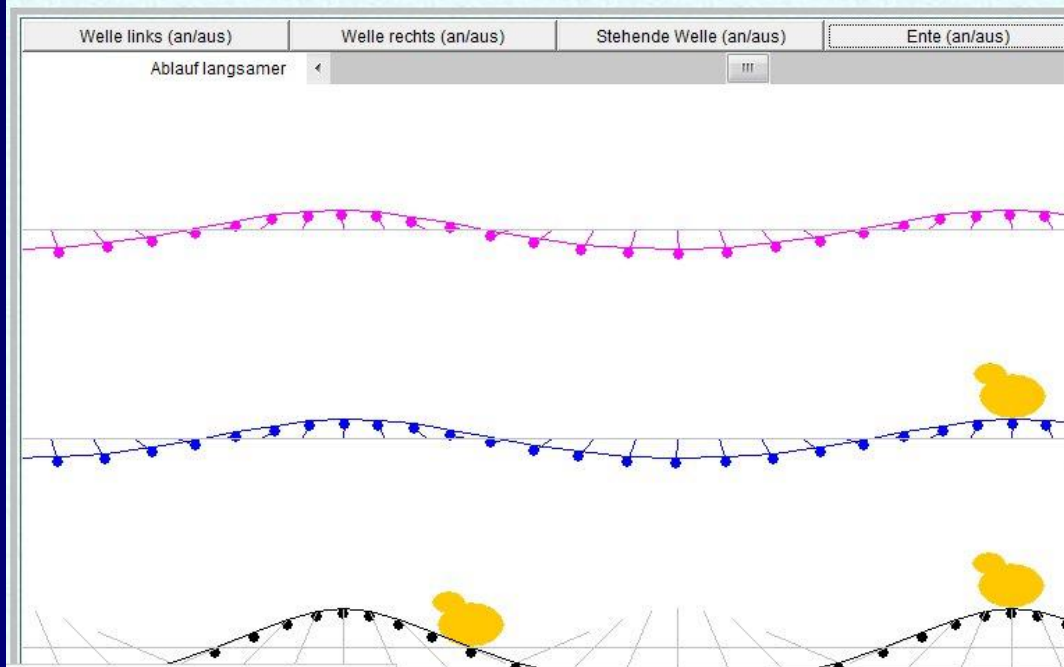
Uni_Münich

Simulation zur Modellvorstellung über Wasserwellen

Wasserwellen sind weder reine Transversalwellen, noch Longitudinalwellen.

Die Teilchen führen kreisende Bewegungen aus. Das Programm zeigt auch, wie sich Objekte an der Oberfläche bewegen.

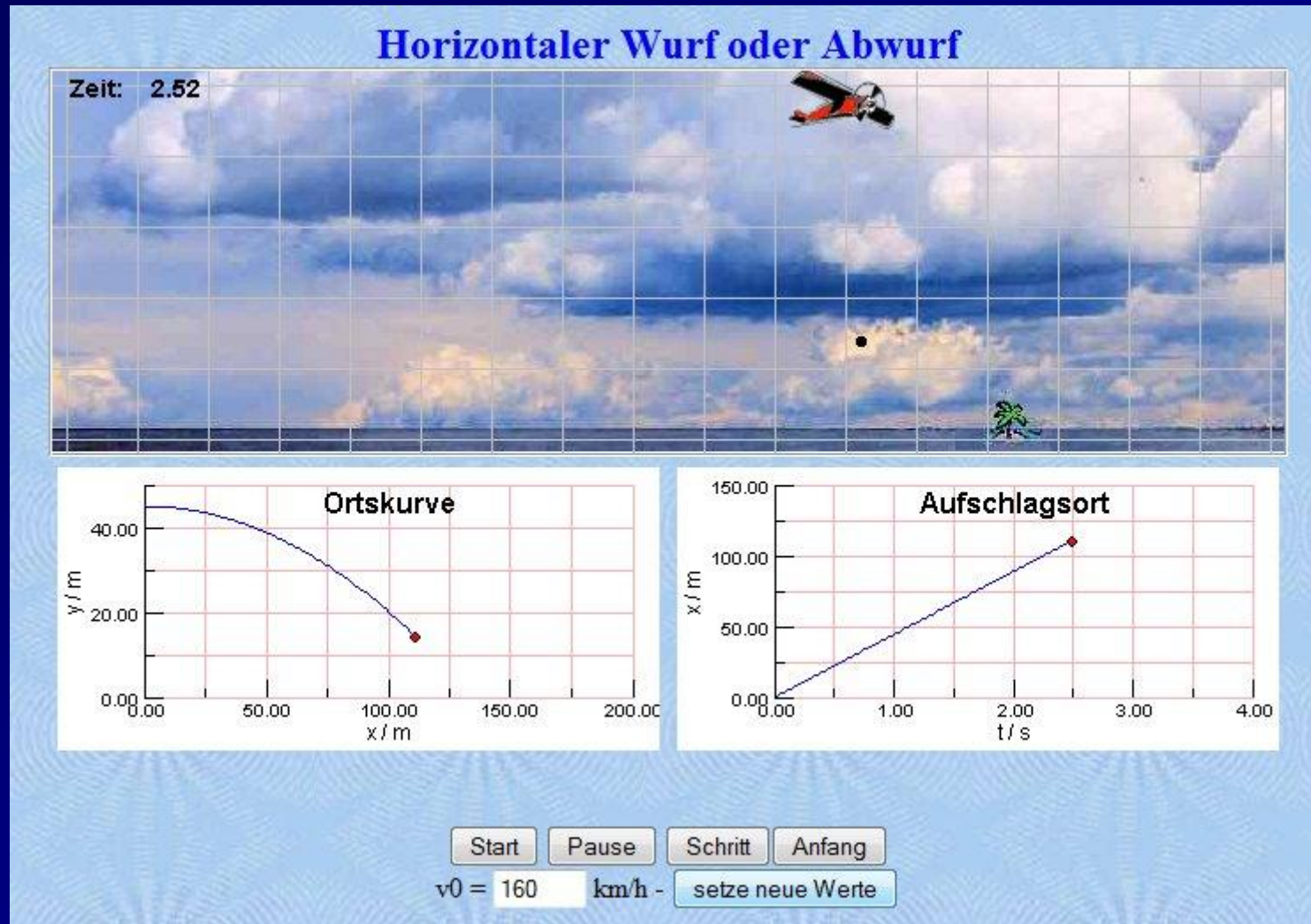
(Achtung: Die Volumina ändern bei inkompressiblen Medien allerdings die Form, was in der Animation nicht gezeigt werden kann. - Hierzu kommt "demnächst" auch ein Applet.)



http://www.didaktikonline.physik.uni-muenchen.de/spezial/wellen/kleine_progr/wasser_jar.html

schulphysik.de

<http://www.schulphysik.de/java/physlet/index.html>

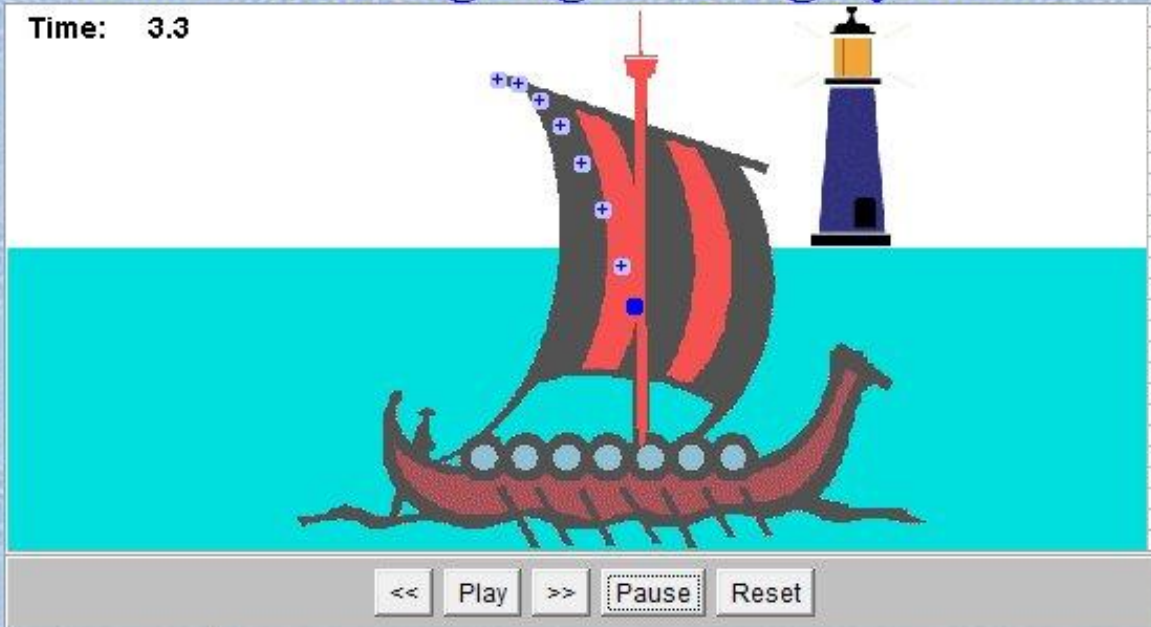


<http://www.schulphysik.de/java/physlet/applets/insel.html>

Relativity of the motion

Relativbewegung - Bezugssysteme

Time: 3.3



Ein Wikinger lässt einen blauen Helm vom Mastkorb eines Schiffes aus frei fallen.

Die Geschwindigkeit des Schiffes ist 2 (m/s).

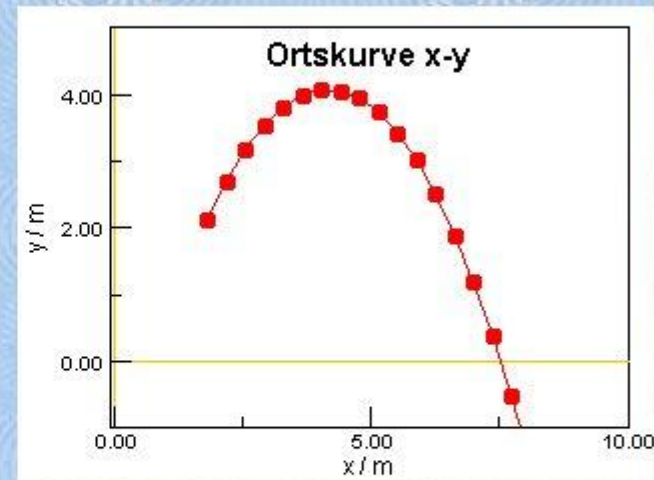
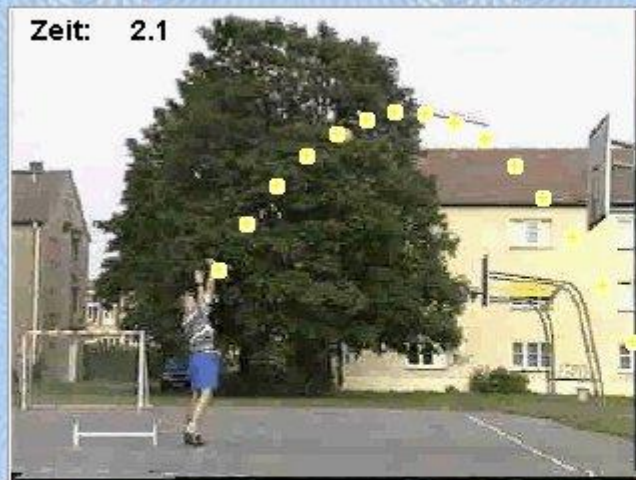
Wir als Beobachter stehen ☒ am Ufer ☐ auf dem Schiff

[Physlet Menu bei MM-Physik](#)

<http://www.schulphysik.de/java/physlet/applets/relativ2.html>

Motion analysis

Videoanalyse



Setze Funktionen und starte

Weiter

Pause

<<Schritt

Schritt>>

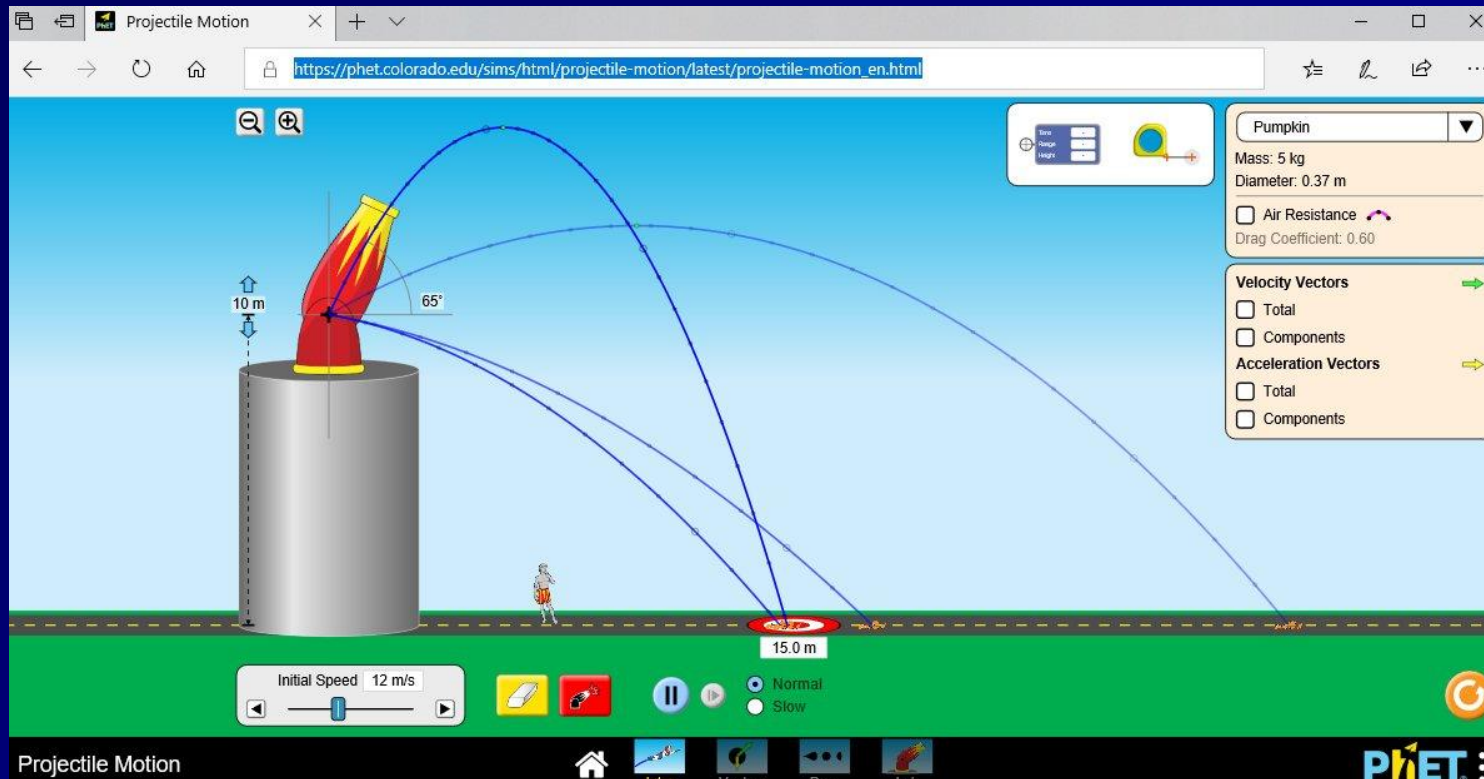
Anfangszustand

$$x(t) = 1.8 + 3.7 \cdot t$$

$$y(t) = 2.1 + 6.2 \cdot t - 9.8/2 \cdot t^2$$

<http://www.schulphysik.de/java/physlet/applets/basket1.html>

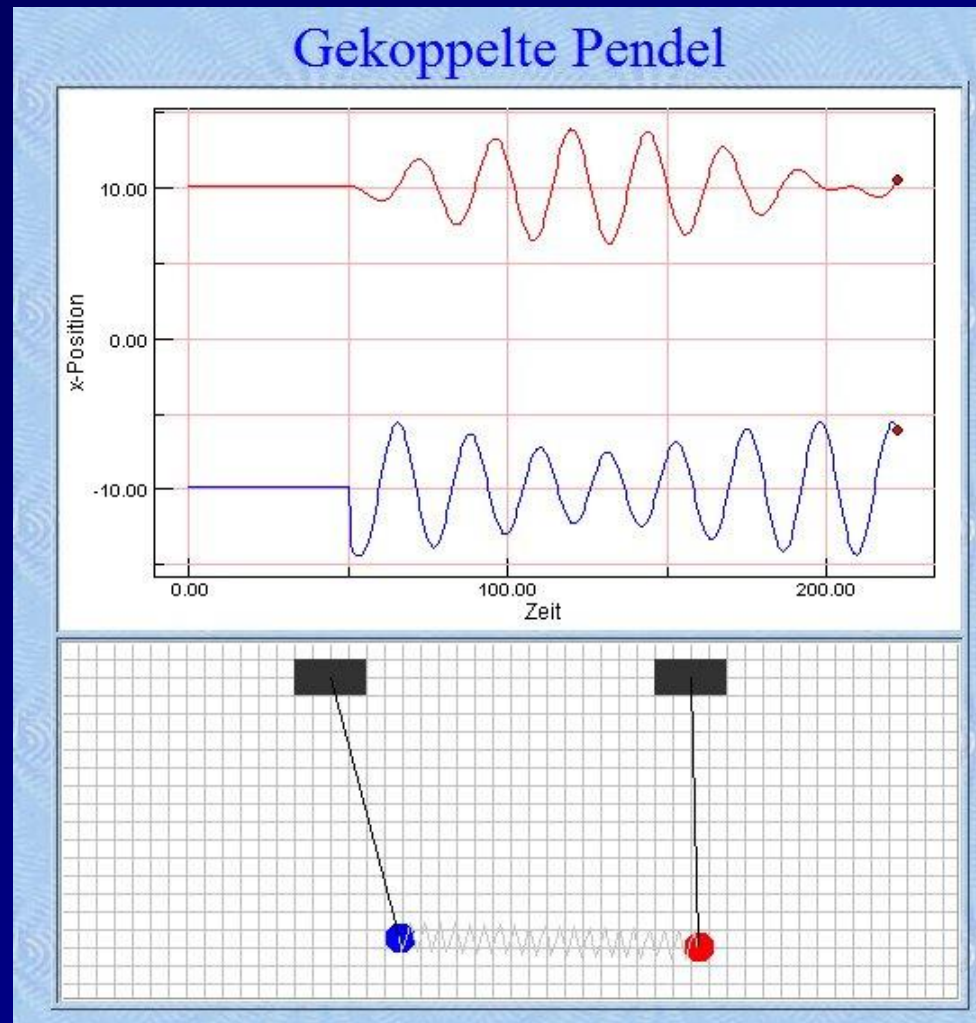
phet.colorado.edu



Two trajectories give the same range
Starting from earth level, the biggest range is with inclination 45°

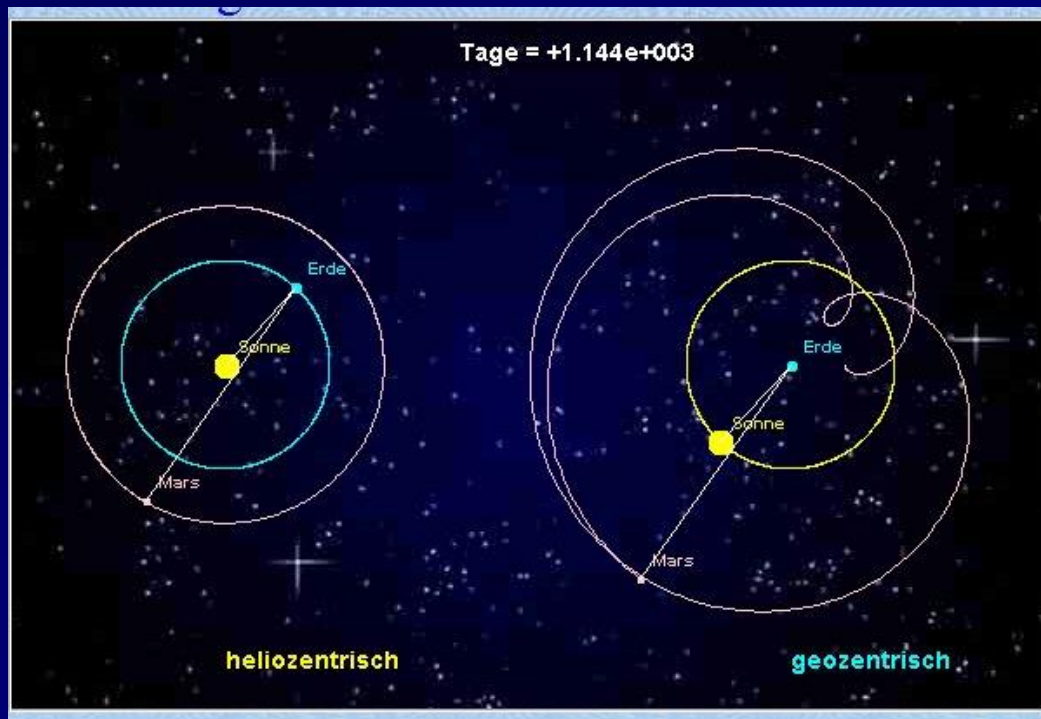
https://phet.colorado.edu/sims/html/projectile-motion/latest/projectile-motion_en.html

Coupled oscillators



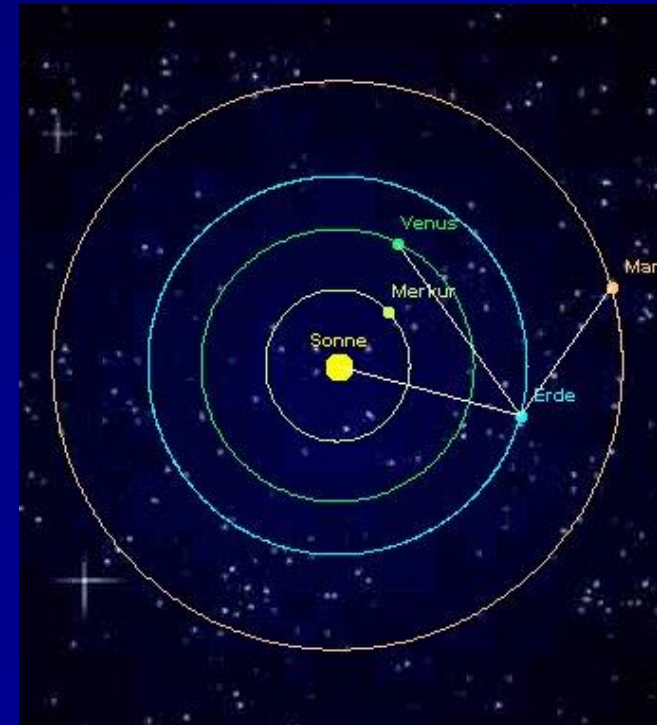
<http://www.schulphysik.de/java/physlet/applets/koppel1.html>

Astronomy – planet's movement

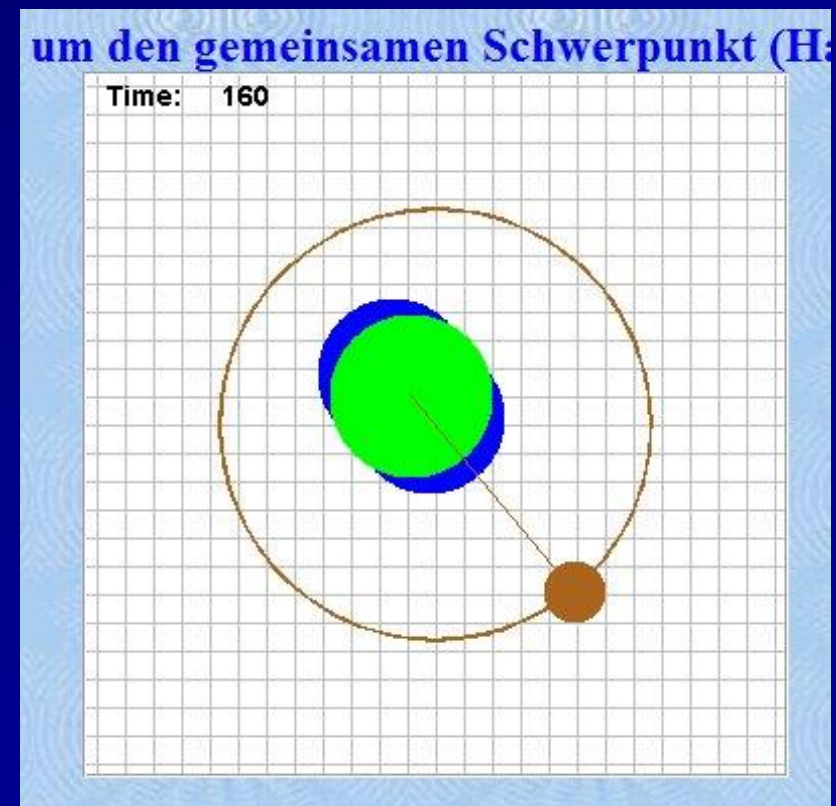


Heliocentric

Geocentrics



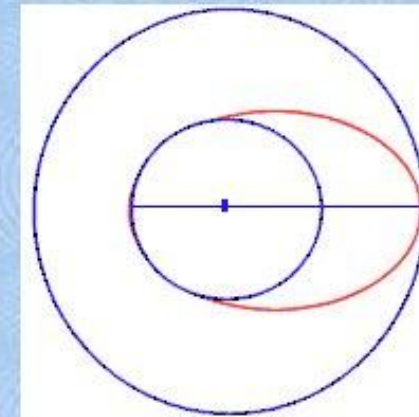
Astronomy – center of mass



<http://www.schulphysik.de/java/physlet/applets/gezeiten1.html>

Astronomy – summing movements

Hohmann Bahn - von Planet zu Planet

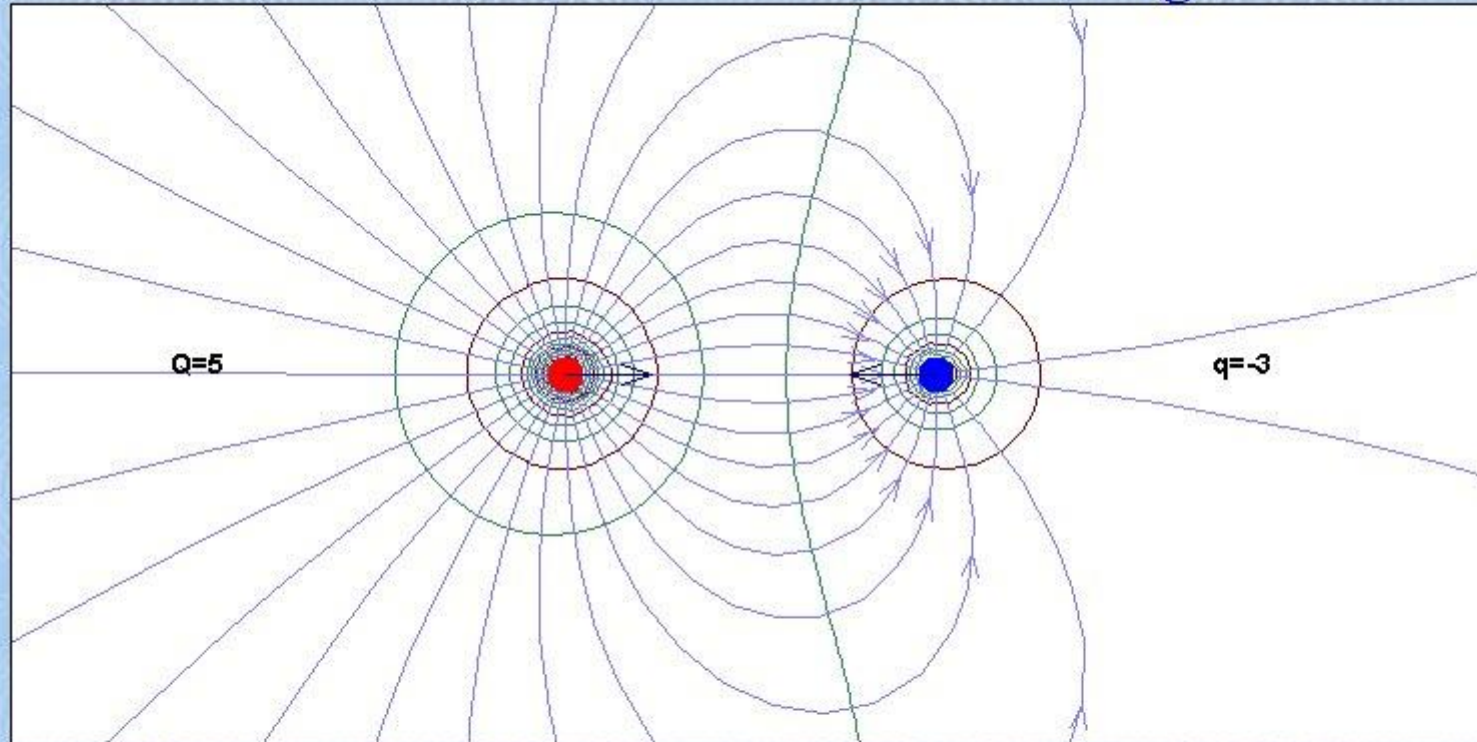


Dabei gilt m
 $v(\text{erde}) = W$
Halbachse d
 $T_2/T_1 = (r_2/r_1)^{3/2}$
Geschwindi
einmal in H
Beispiel: Erd
 $a = 3,1 \text{ AE}$ u
 $v(\text{periheil}) =$
 $v(\text{periheil}) =$

<http://www.schulphysik.de/java/physlet/applets/hohmann1.html>

Equipotential surfaces

Elektrisches Feld von zwei Ladungen

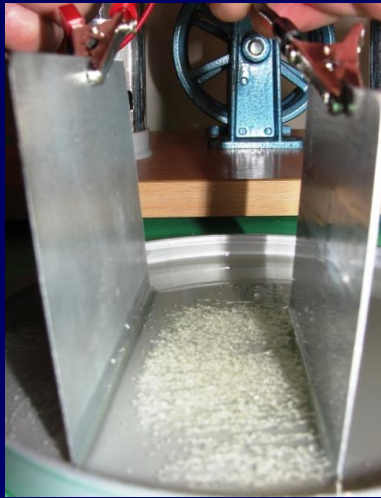


Die Ladung Q beträgt nC und die Ladung $q = -3$ nC.

Ich will ☐ Feldvektoren ☒ Potentiallinien sehen

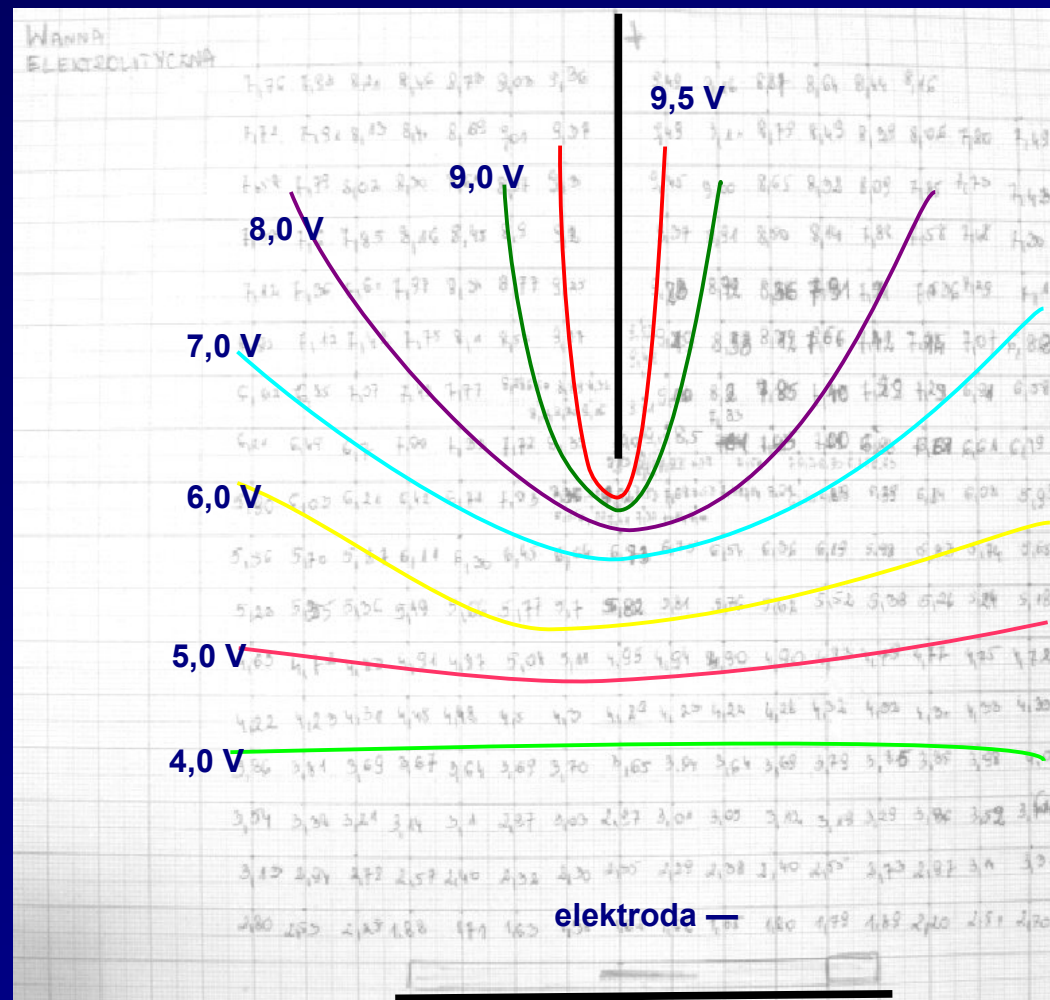
<http://www.schulphysik.de/java/physlet/applets/efeld1.html>

Equipotential surface (experiment)



Sadowska, Karwasz, Stara poczwiwa maszyna (elektrostatyczna)
Fizyka w Szkole 5/2011, 40-50

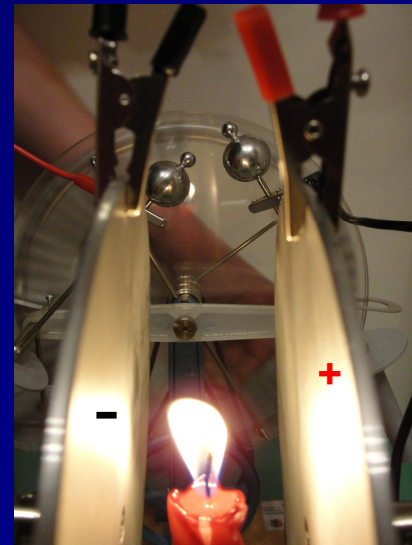
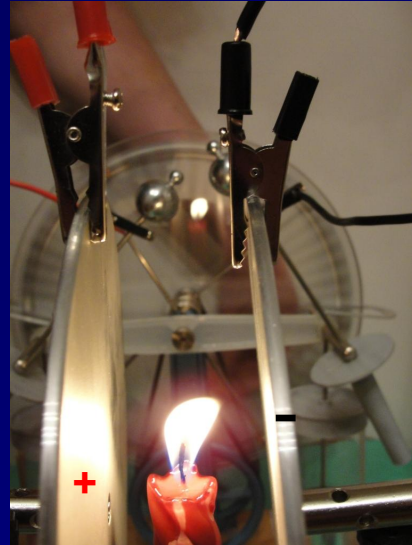
Equipotential surface (experiment)



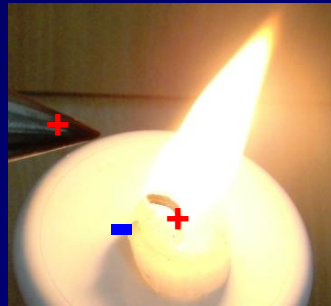
Sadowska, Karwasz, to be published

http://dydaktyka.fizyka.umk.pl/Publikacje_2011/Maszyna_el_2011.pdf

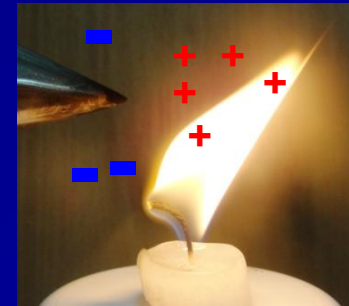
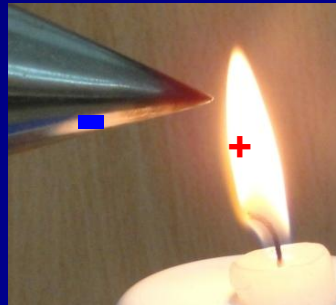
Equipotential surface (experiment)



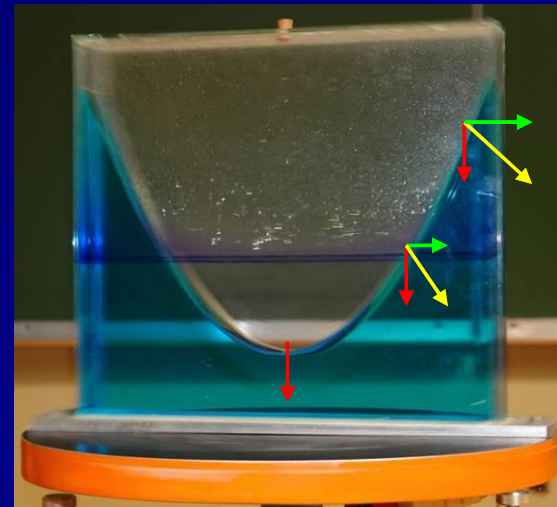
Equipotential surface (experiment)



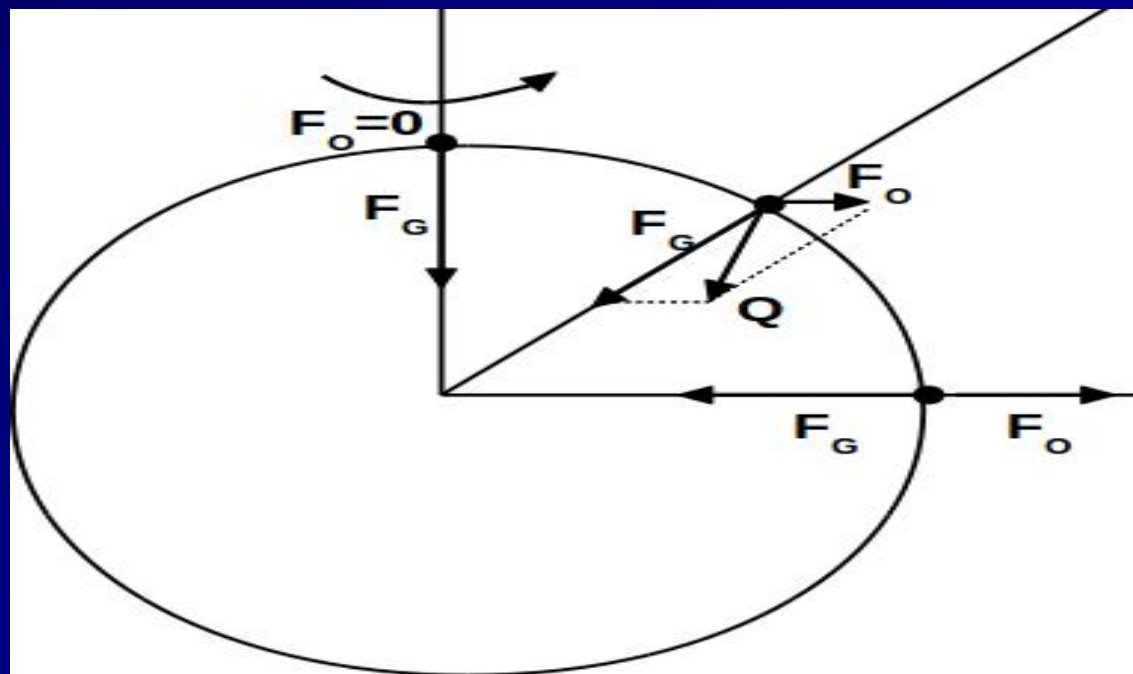
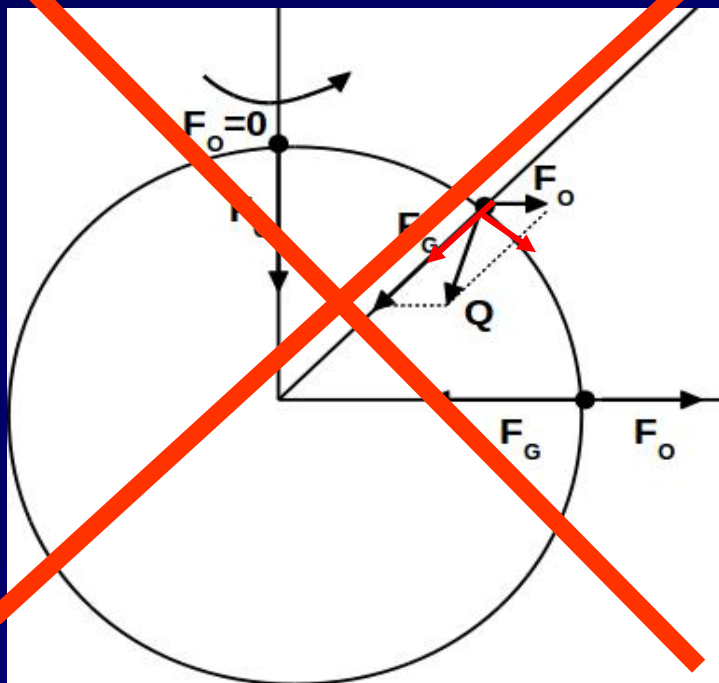
F



Equipotential surface (experiment)



„geoid”



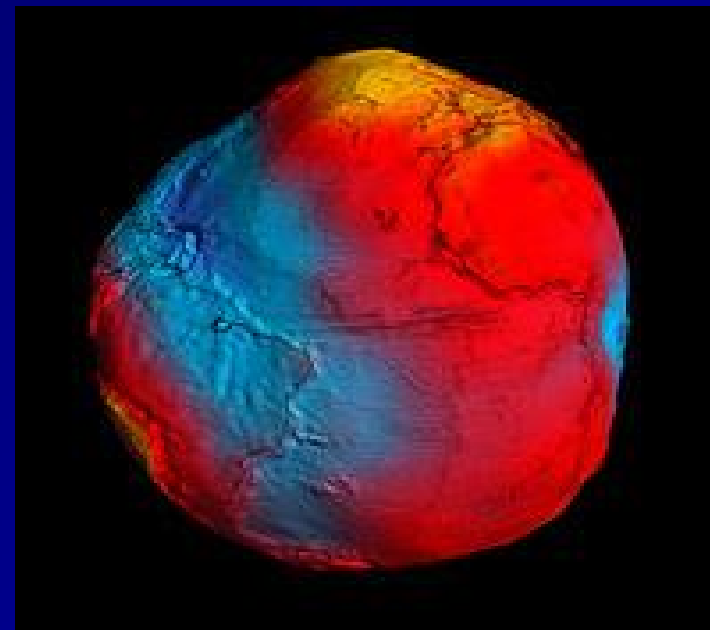
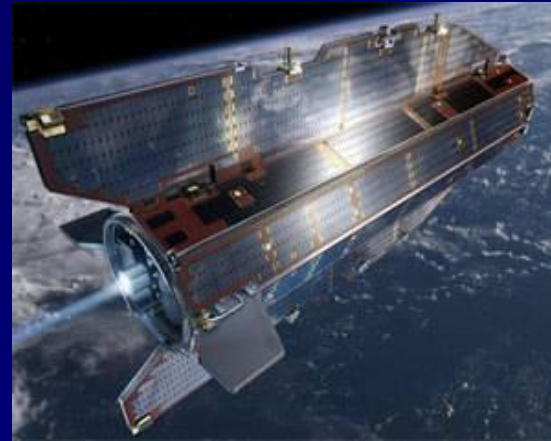
Wojciech Karwacz, Foton, 114, 2011

www.ig.uj.edu.pl/Publikacje_2011/Elipsoida_2011.pdf

„Kula” ziemiska, Geografia w Szkole 6/2011, 45-51

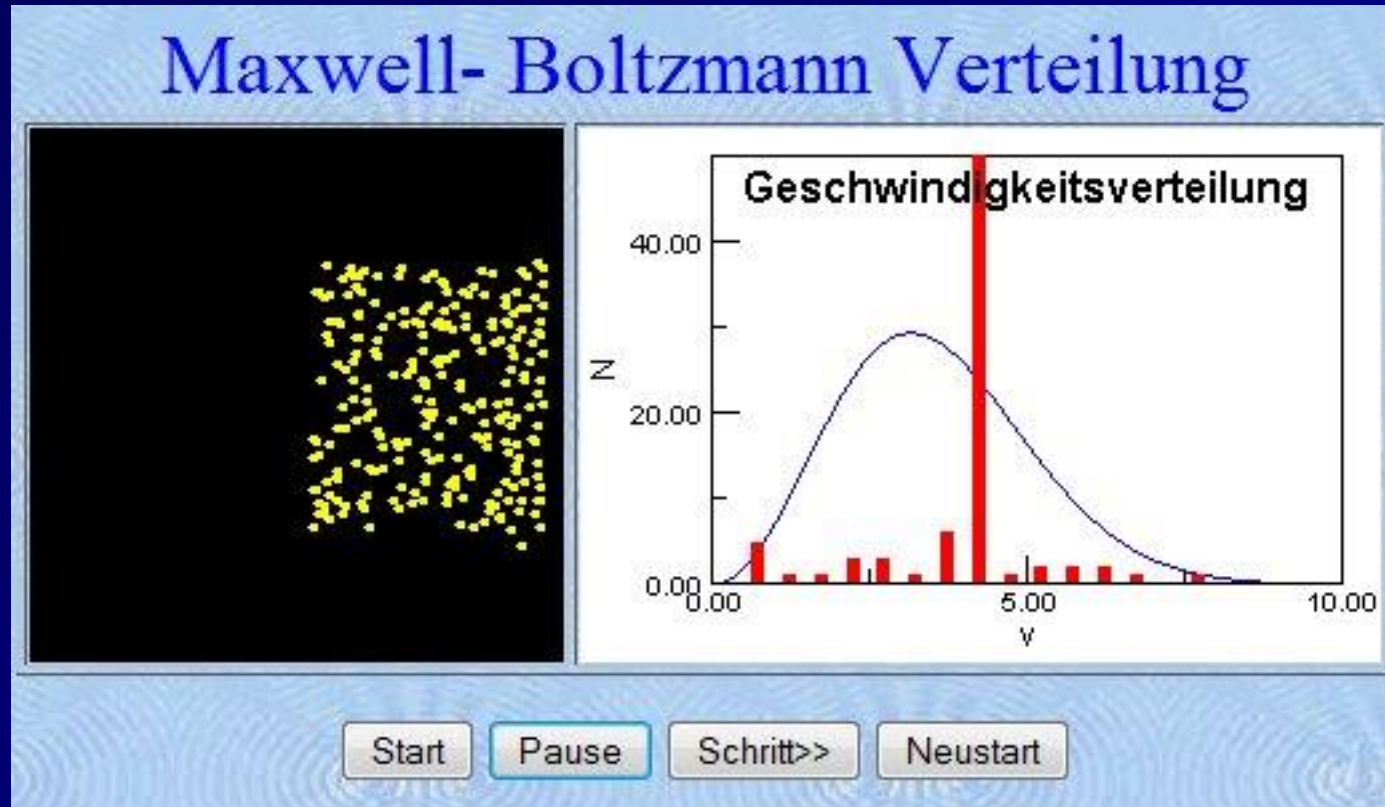
www.ig.uj.edu.pl/Wyklady_Filmy/Kula_ziemska_JCh_GK_2011.pdf

„geoida”



1. J. Chojnacka, G. Karwasz, *Foton*, 114, 2011
2. http://www.jch.ujk.pl/Publikacje_2011/Elipsoida_2011.pdf
3. J. Chojnacka, „Kula” ziemiska, *Geografia w Szkole* 6/2011, 45-51
4. http://www.jch.ujk.pl/Wyklady_Filmy/Kula_ziemska_JCh_GK_2011.pdf

Maxwell's distribution

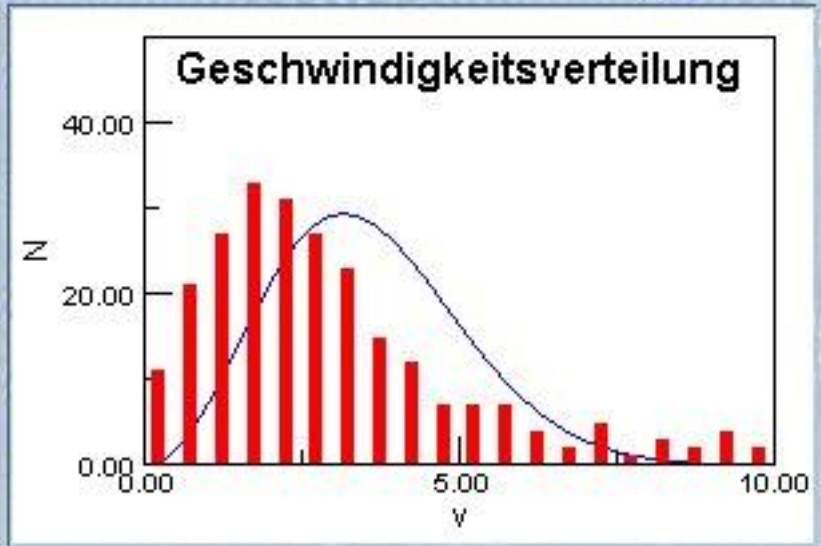
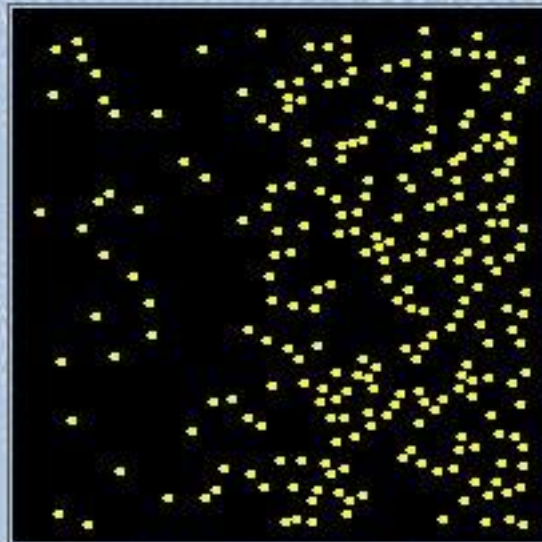
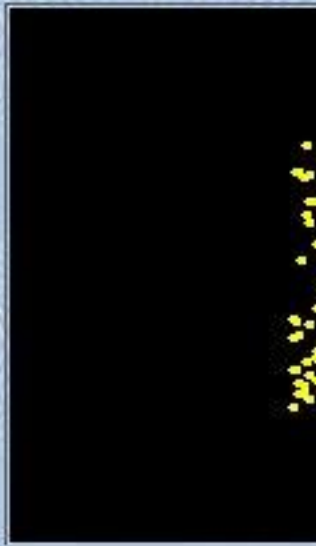


<http://www.schulphysik.de/java/physlet/applets/maxwell.html>

Maxwell's distribution

Maxwell- Boltzmann Verteilung

Maxwell- Boltzmann Verteilung



Start

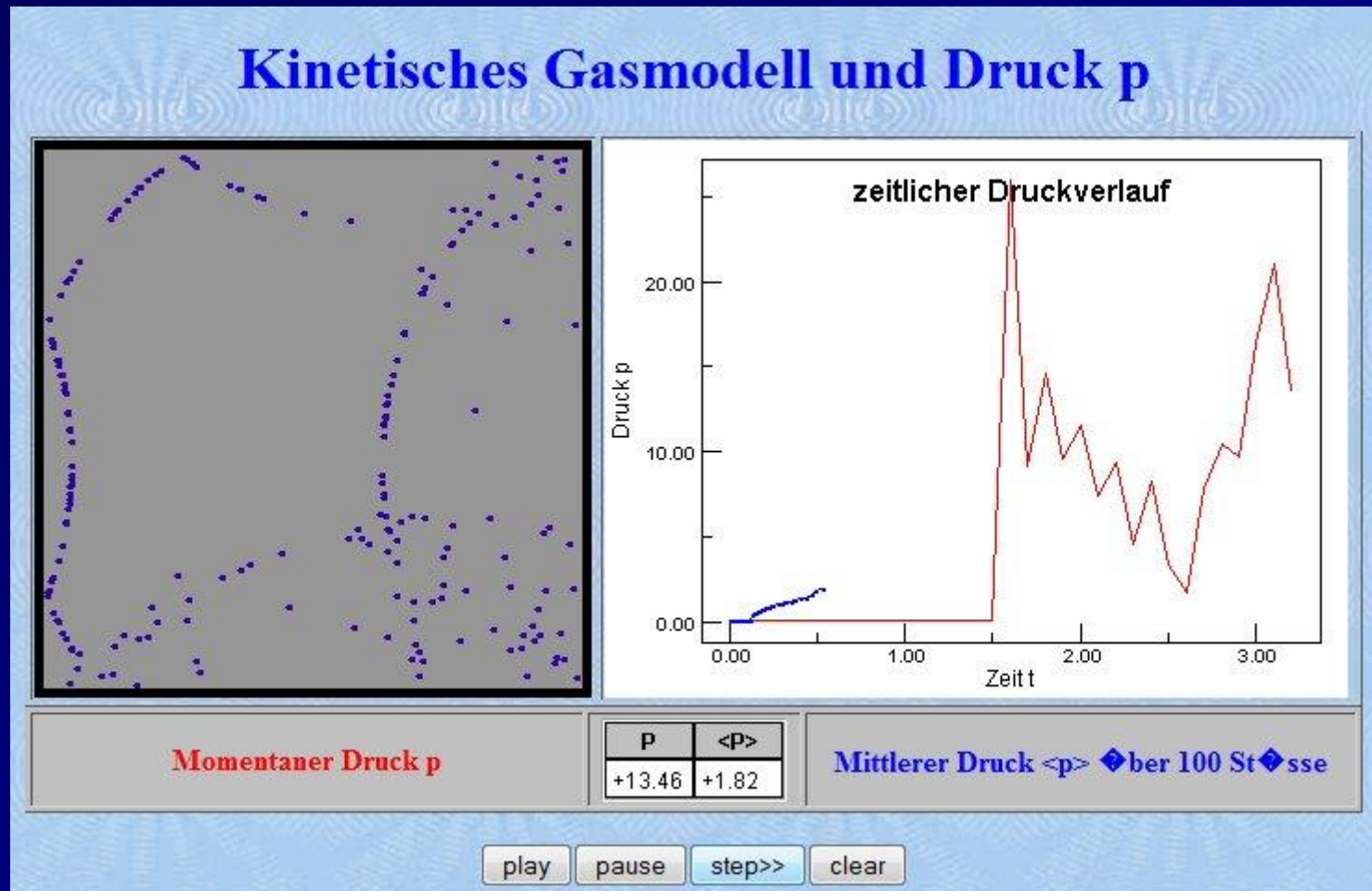
Pause

Schritt>>

Neustart

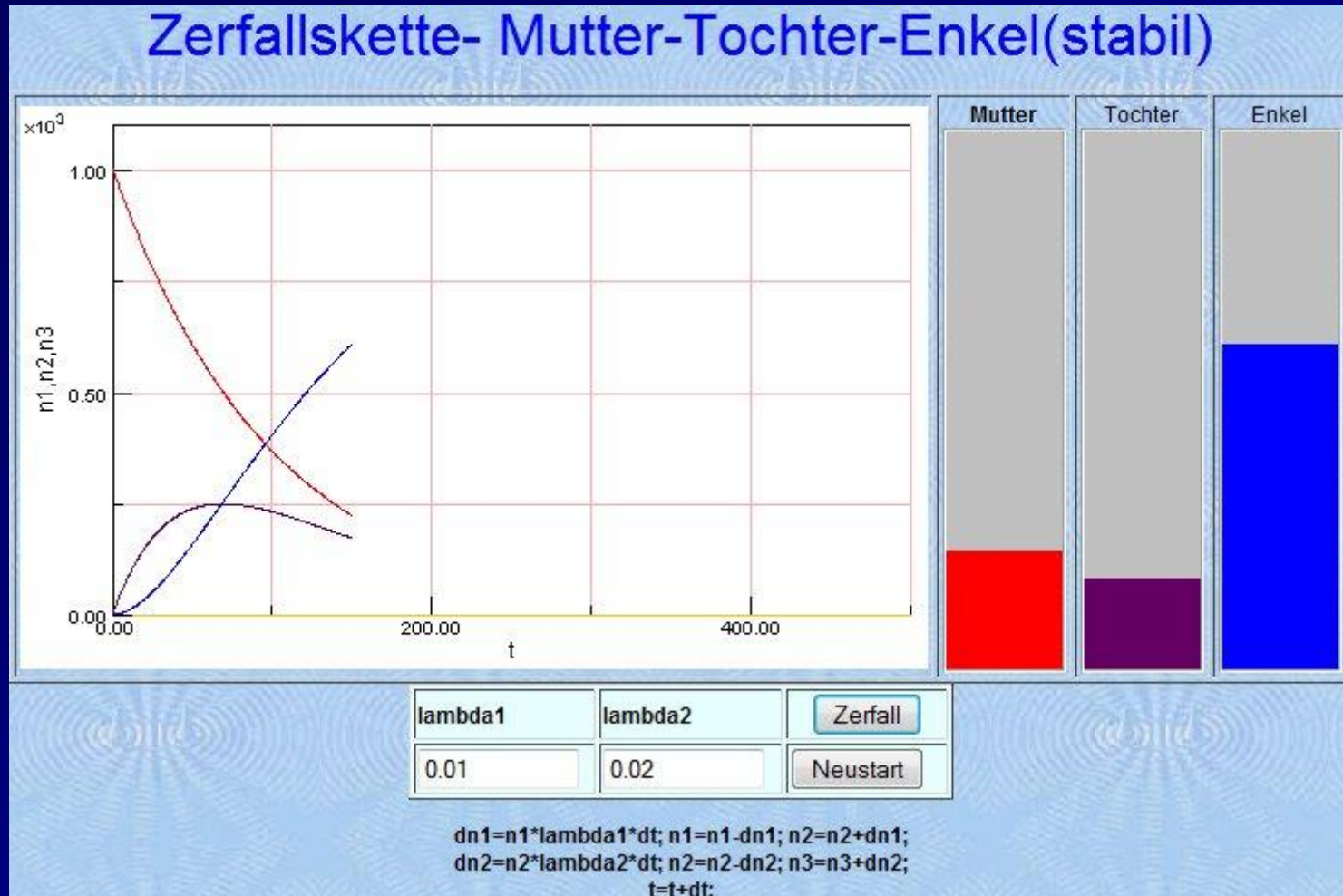
<http://www.schulphysik.de/java/physlet/applets/maxwell.html>

Shock wave



<http://www.schulphysik.de/java/physlet/applets/druck1.html>

Radioactive decay



<http://www.schulphysik.de/java/physlet/applets/radkett2.html>



<http://www.schulphysik.de/java/physlet/applets/radkett2.html>

Hard-spheres collisions

The screenshot shows the PhET 'Hard-spheres collisions' simulation interface. At the top center, two spheres are shown: a red sphere labeled '1' moving to the left and a green sphere labeled '2' moving to the right. Below them are control buttons: 'Restart', 'Tył' (Back), 'Start', and 'Przód' (Forward). To the right of these buttons is a 'Tempo' slider and a 'Czas = 1.44 s' display. In the bottom left, a table lists the mass of each sphere, with sliders for adjustment. A 'Więcej danych' (More data) button is below the table. In the top right, a settings panel includes checkboxes for 'Wektory prędkości' (Velocity vectors), 'Wektory pędu' (Momentum vectors), 'Środek masy' (Center of mass), 'Wykres momentów' (Torque graph), 'Energia kinetyczna' (Kinetic energy), and 'Pokaż wartości' (Show values). It also features an 'Elastyczność 100%' (Elasticity 100%) slider, a 'Wyczyść' (Clear) button, and a 'Dźwięk' (Sound) checkbox.

Piłka	Masa kg
1	0.5
2	1.5

Wczyść

Wektory prędkości
Wektory pędu
Środek masy
Wykres momentów
Energia kinetyczna
Pokaż wartości

Elastyczność 100%

0% 100%

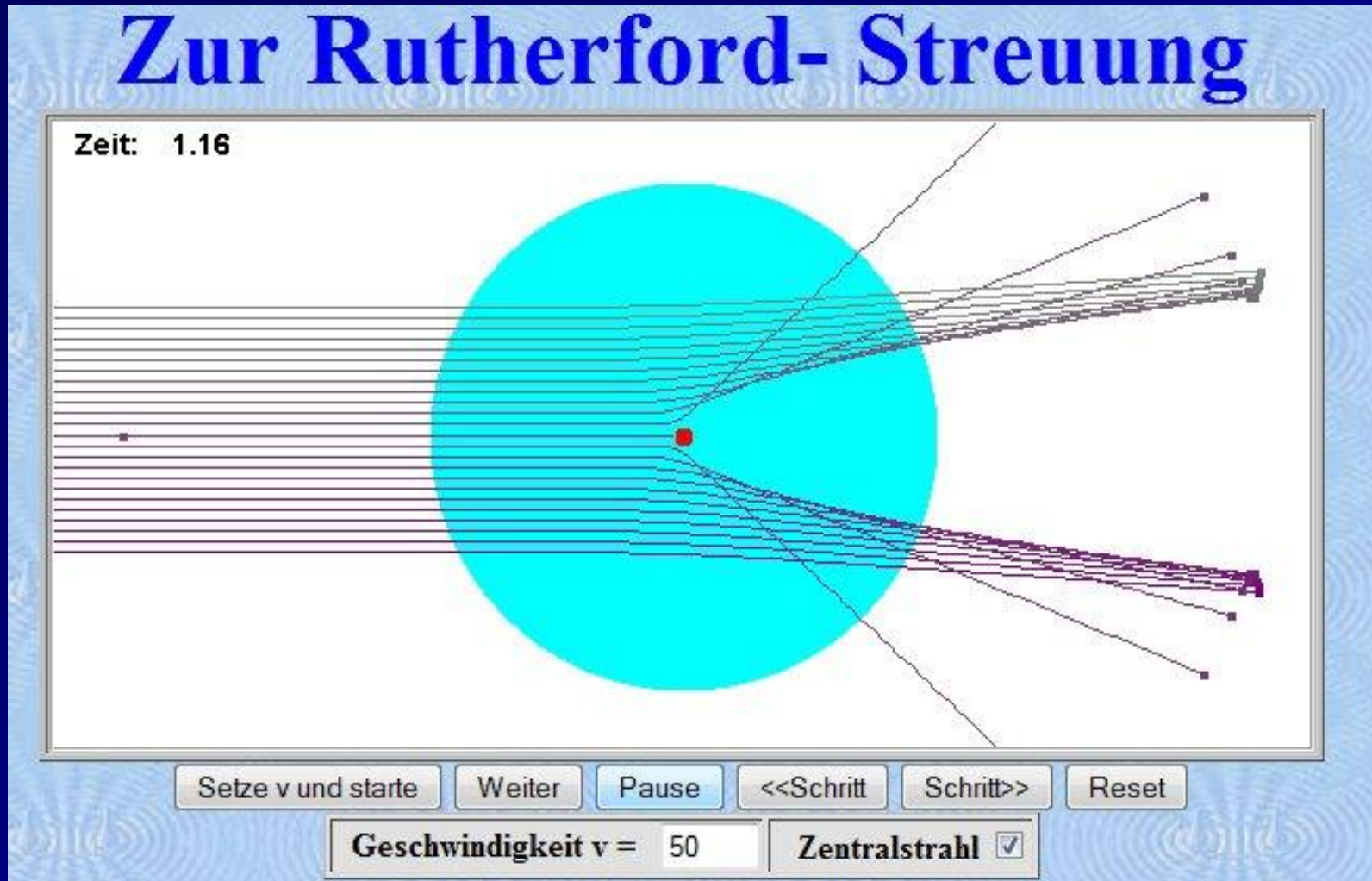
Dźwięk

Restart Tył Start Przód

Tempo Czas = 1.44 s

Więcej danych

Rutherford scattering



<http://www.schulphysik.de/java/physlet/applets/rutherford.html>

and many, many more...

■ See the 2019 Multimedia Lab
@ Didactics of Physics Division
dydaktyka.fizyka.umk.pl

or moodle7.fizyka.umk.pl