

Promoting environmental physics issues in science centers and at science-events

Alpár Vörös¹, Zsuzsa Sárközi²

¹Apáczai Csere János Highschool, Cluj-Napoca, Romania

²Babes-Bolyai University, Cluj-Napoca, Romania

Promoting environmental physics

Informal learning activities:

- science centers:

- MUSE Trento, Italy
- Phaeno Wolfsburg, Germany
- Techniquest Cardiff, Wales UK
- Science Museum London, UK
- Technisches Museum Wien, Austria
- NEMO Center, Amsterdam, Netherlands
- Csodák Palotája Budapest, Hungary

- science events (s.a. Saturday of Experiments at Physics Department of Babes-Bolyai University)

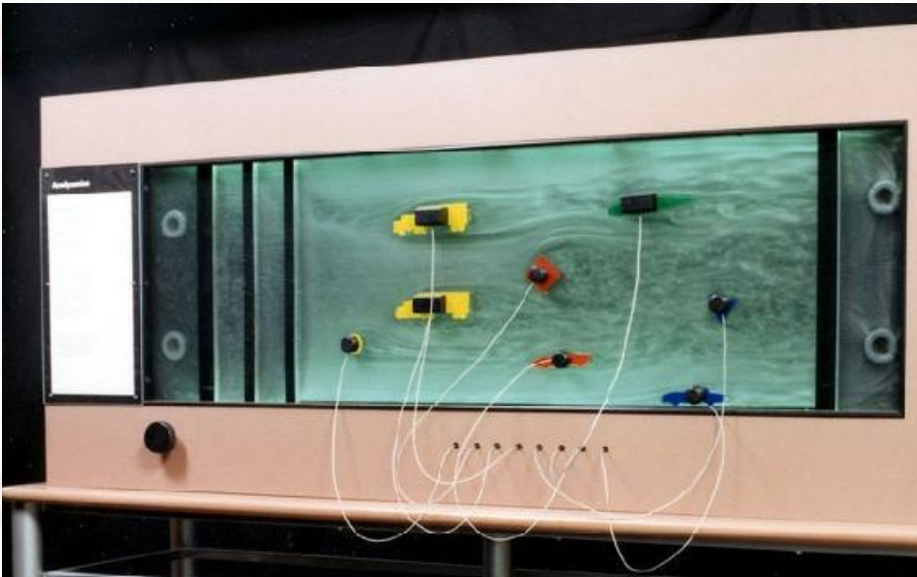
School related activities:

- student research projects:

- studying soliton waves
- thermal comfort of schools and houses
- CO₂ concentration in schools

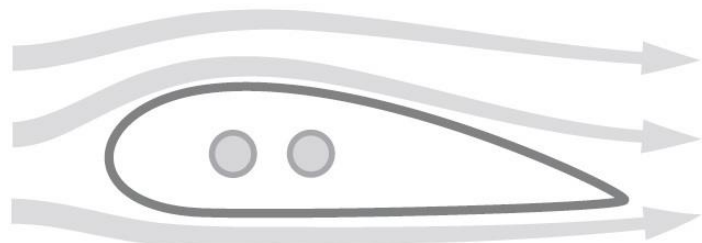


Flow tank

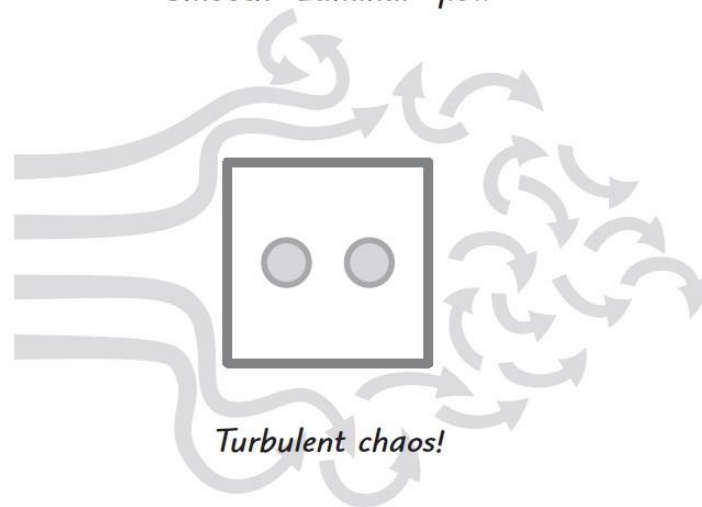


- different shapes can be moved in the flow of a fluid
- turbulent flow against laminar flow

Flow tank



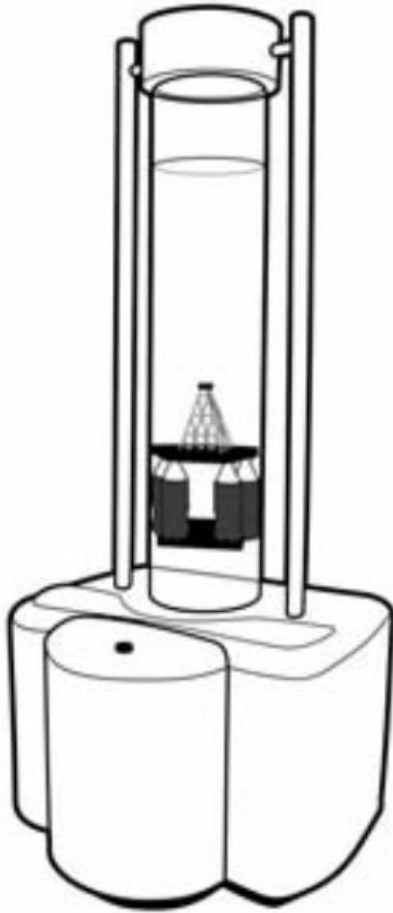
Smooth "Laminar" flow



Turbulent chaos!

- aircraft wings, lift
- rounded shapes = saving energy

Bermuda bubbles



hundreds of ships disappeared
in the Bermuda triangle

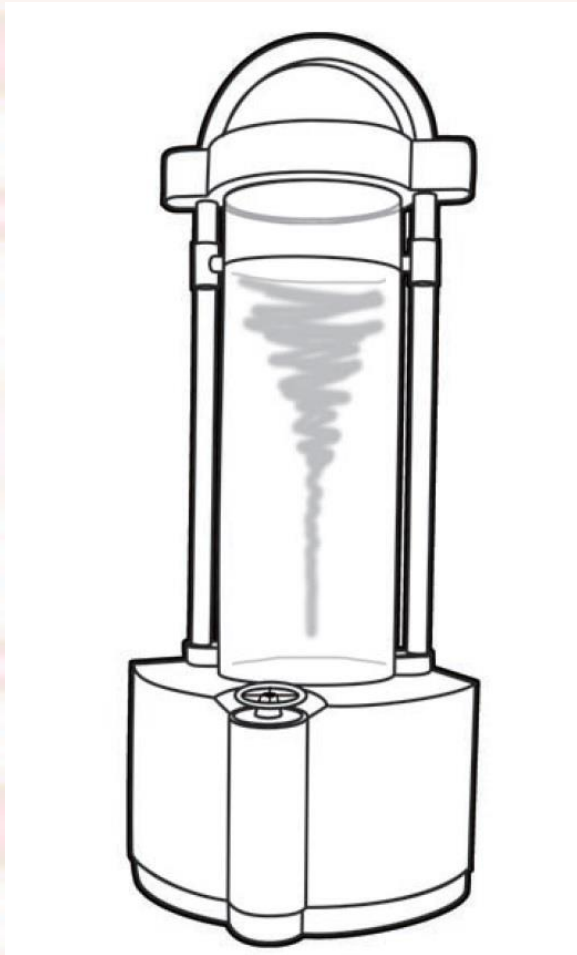
things float when they are
lighter than the fluid
surrounding them

Bermuda bubbles



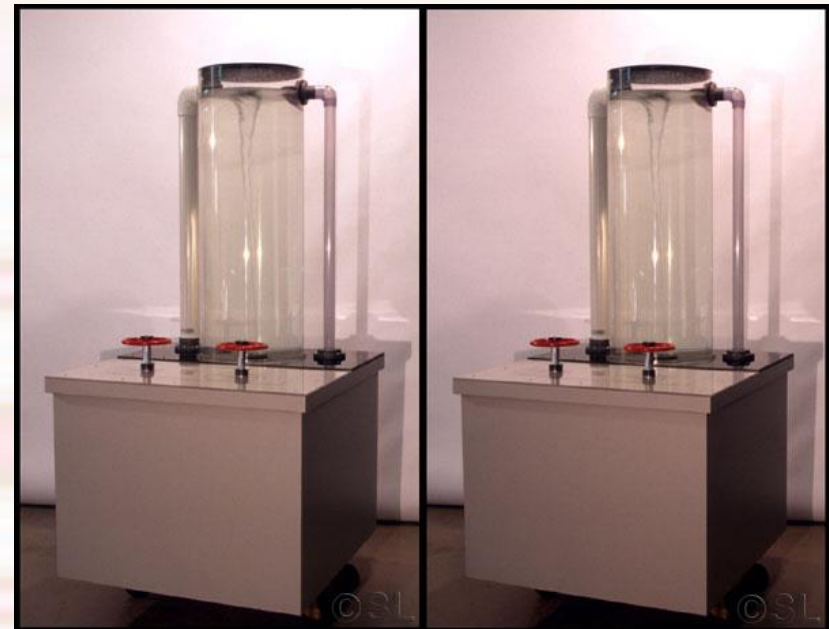
- if the water is full of bubbles it is a much lighter fluid than ordinary water
- water full of bubbles can't hold the ship up

Vortex, tornado

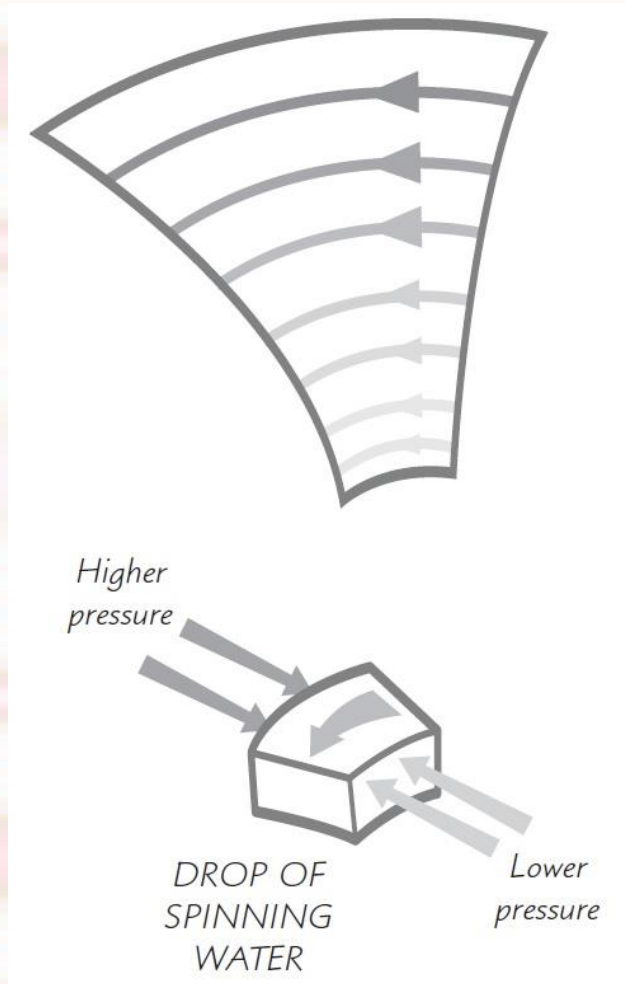


TECHNIQUEST

large whirlpool exhibit where the visitor controls the speed of flow and the size of the whirlpool



Vortex, tornado



- there is a pressure difference between the center and the sideways of the vortex
- only way to escape a vortex is to go down



Coanda effect

- is the tendency of a fluid jet to be attracted by a nearby surface
- it led to the development of jet engines

**A Romanian makes it possible
for 1.5 billion people to get
together every year.**



He invented the jet engine in 1910.
Visit Romania. Small country. Great people.

Saturday of experiments



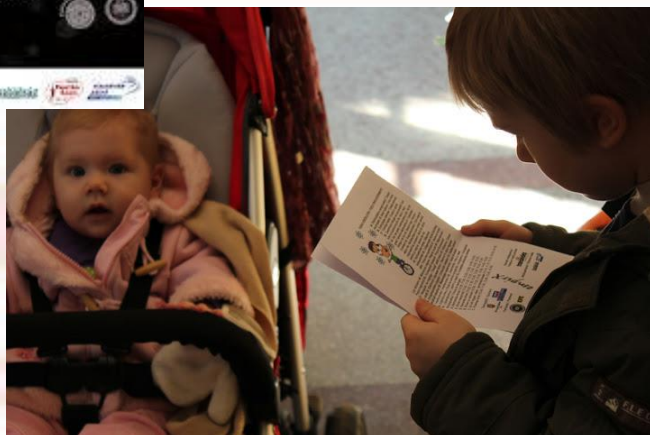
Organizer: EmpirX Association and Department of Physics from Babeş-Bolyai University

Location: main building and the courtyard of the university

Time: every spring in April, May – a one day event

Method:

- guided experiments (40-50 exhibits), but most of them are hands-on
- map with the event site and location of different experiments



Saturday of experiments



Participants: 500-1000 each event, mainly from Cluj county, but organized groups from all over Transylvania as well

It is an excellent way for practice for students studying at the Physics Department

Grants: Bethlen Gábor Alap (Hungary), County Council of Cluj and local sponsors

Other events: Hungarian Cultural Days of Kolozsvár, Children Day activities



Saturday of experiments



Advantages:

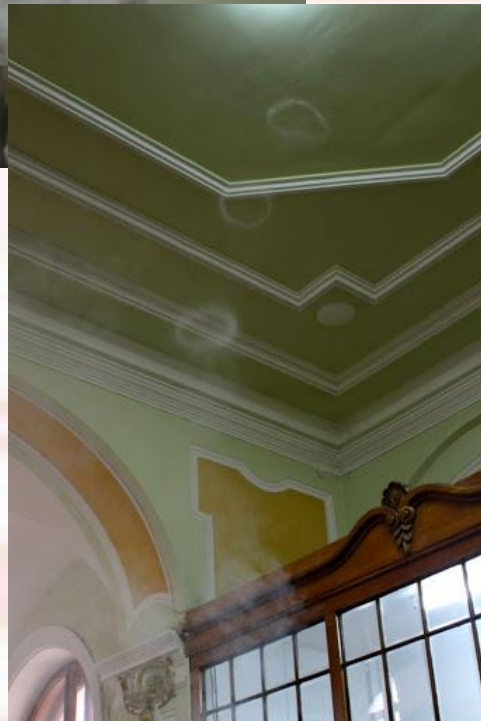
- possibility to pose questions at each exhibit, to have a discussion on the observed phenomena with a young scientist
- low budget event
- suitable explanations for every age group
- teambuilding for the students



Disadvantages:

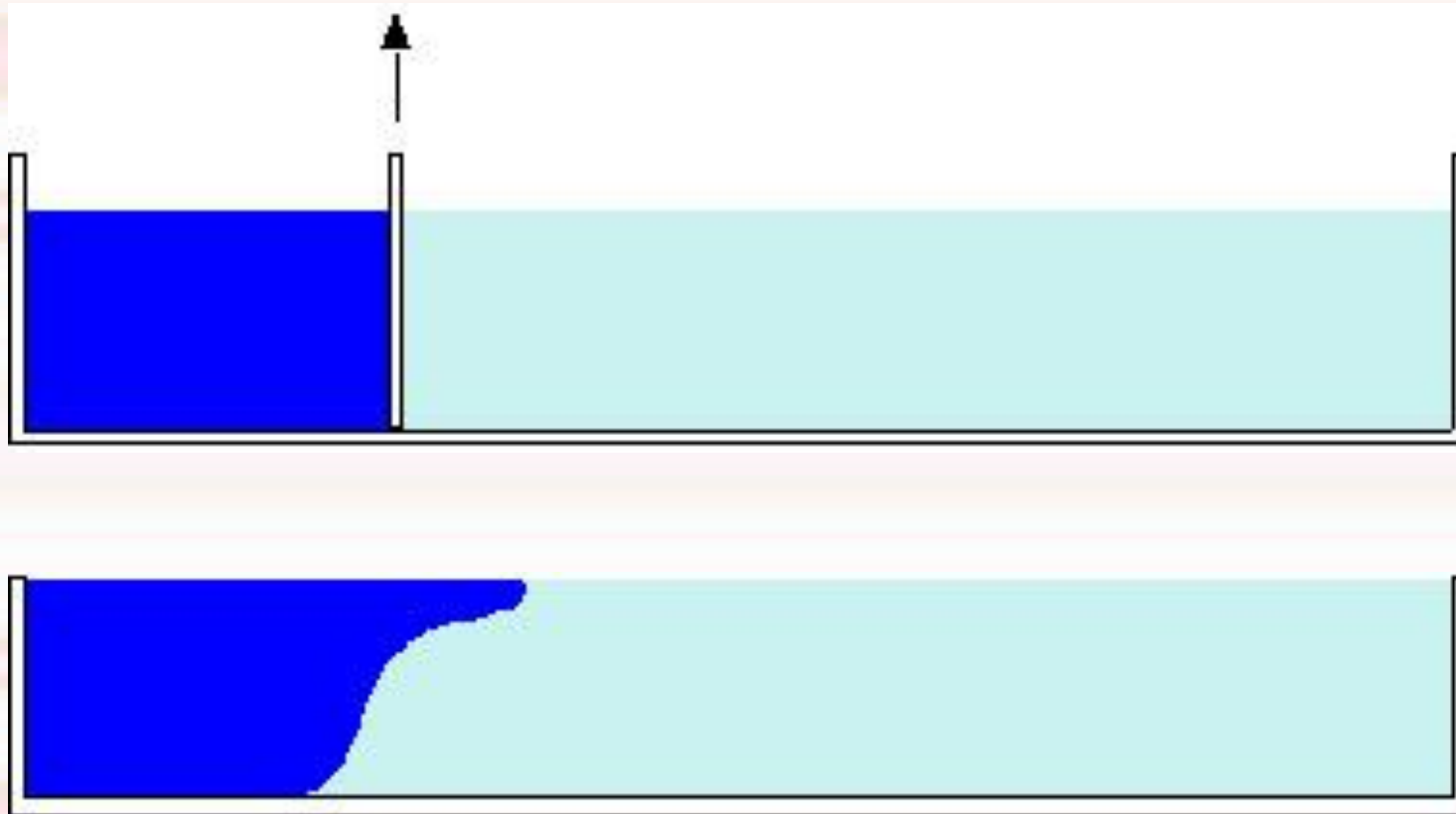
- a lot of volunteers needed
- overcrowded
- organized only once a year

Saturday of experiments – smoke rings



- first experiment at the entrance must be something hands-on, a very playfull one, one compelling for the mind
- like: smoke rings

Saturday of experiments – weather fronts



<http://www.karman.elte.hu/>

Saturday of experiments - soliton waves

- nonlinear waves with high amplitude which preserve their coherent shape
- dimension of the water tank: 297x12,8x35 cm

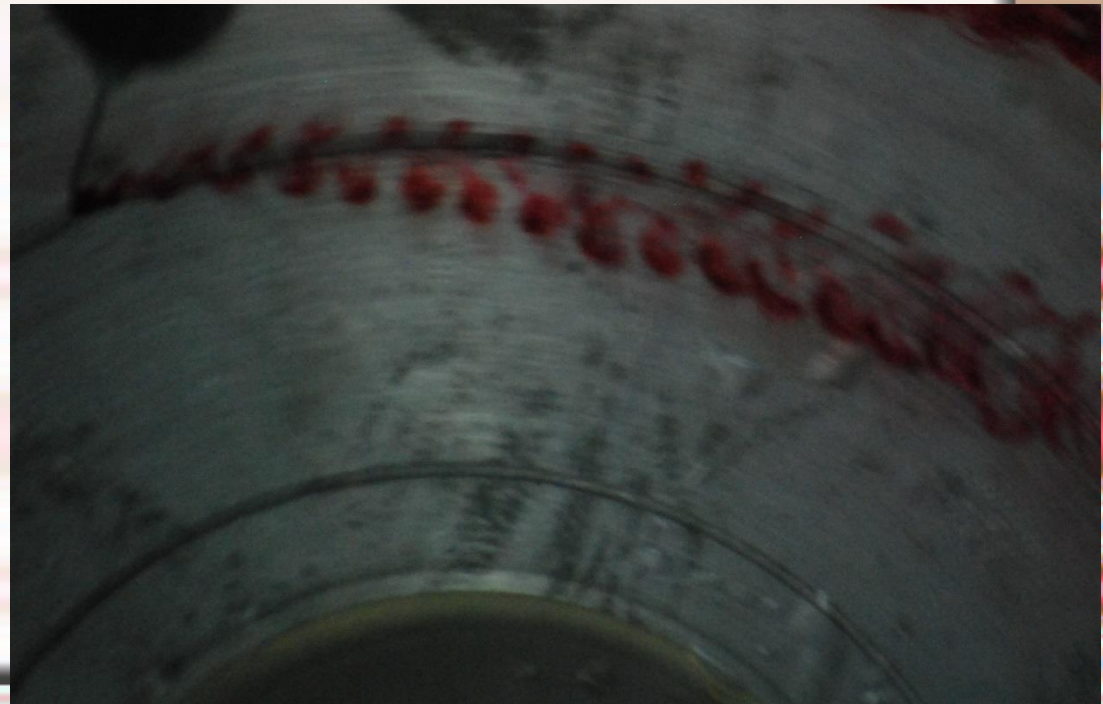


Saturday of experiments - von Kármán vortex street



Landsat 7 satellite image in September 1999
above Selkirk Island, off South America.
Credit: Bob Cahalan/NASA, USGS

we use the rotating disc to create a
stream along the needle of the
syringe, that stands as an obstacle



Saturday of experiments
– concentration gradient in gravitational field



Experiment by prof. Zoltán Néda

Saturday of experiments – other experiments



- surface tension
- blown by the He
- red Sun at sunset

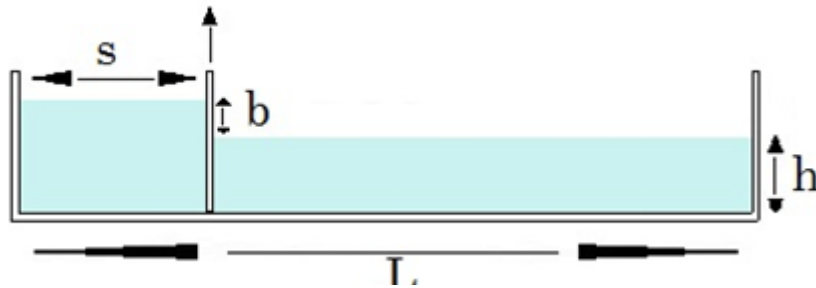
Saturday of experiments

Understanding the universe:

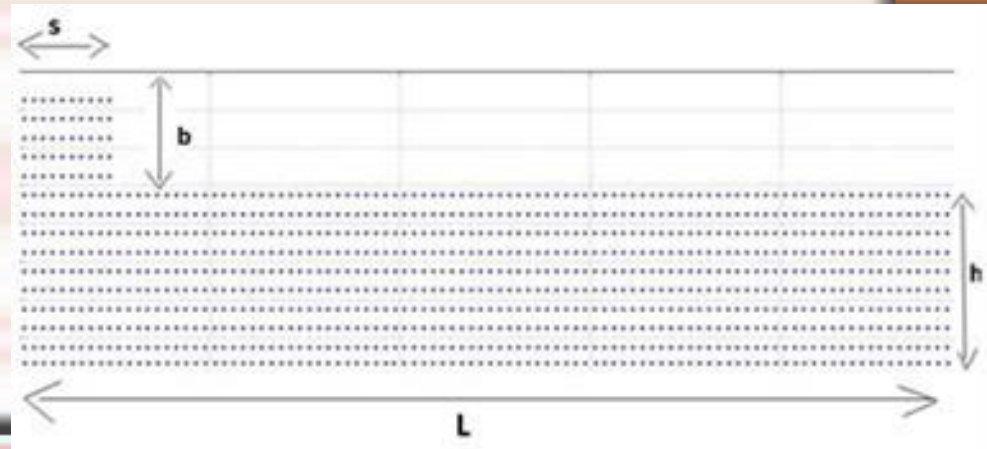
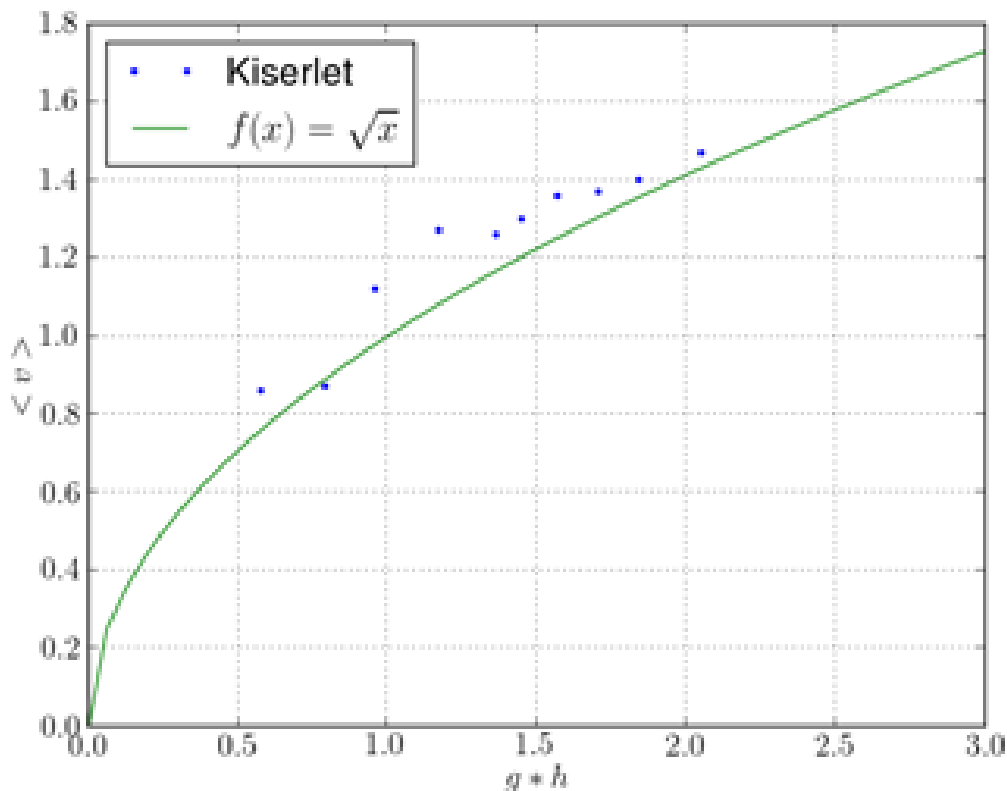
- observing the sunspots
- making the curvature of space visible



Research project: soliton waves simulation with 11th grade students (Bartha Vivien, Biro Botond)



- molecular dynamical simulation
- experimental measurements: speed of travelling of the wave against depth of water times gravitational constant
- presented at science conferences for youth



Thank you for your attention!

