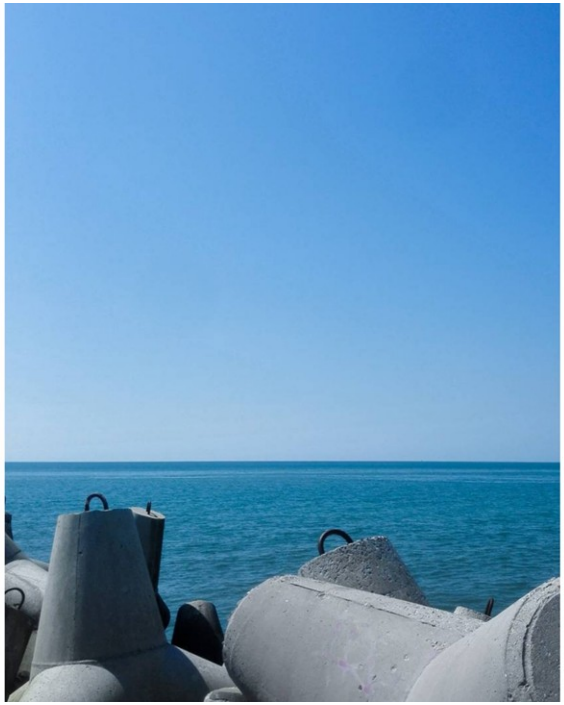


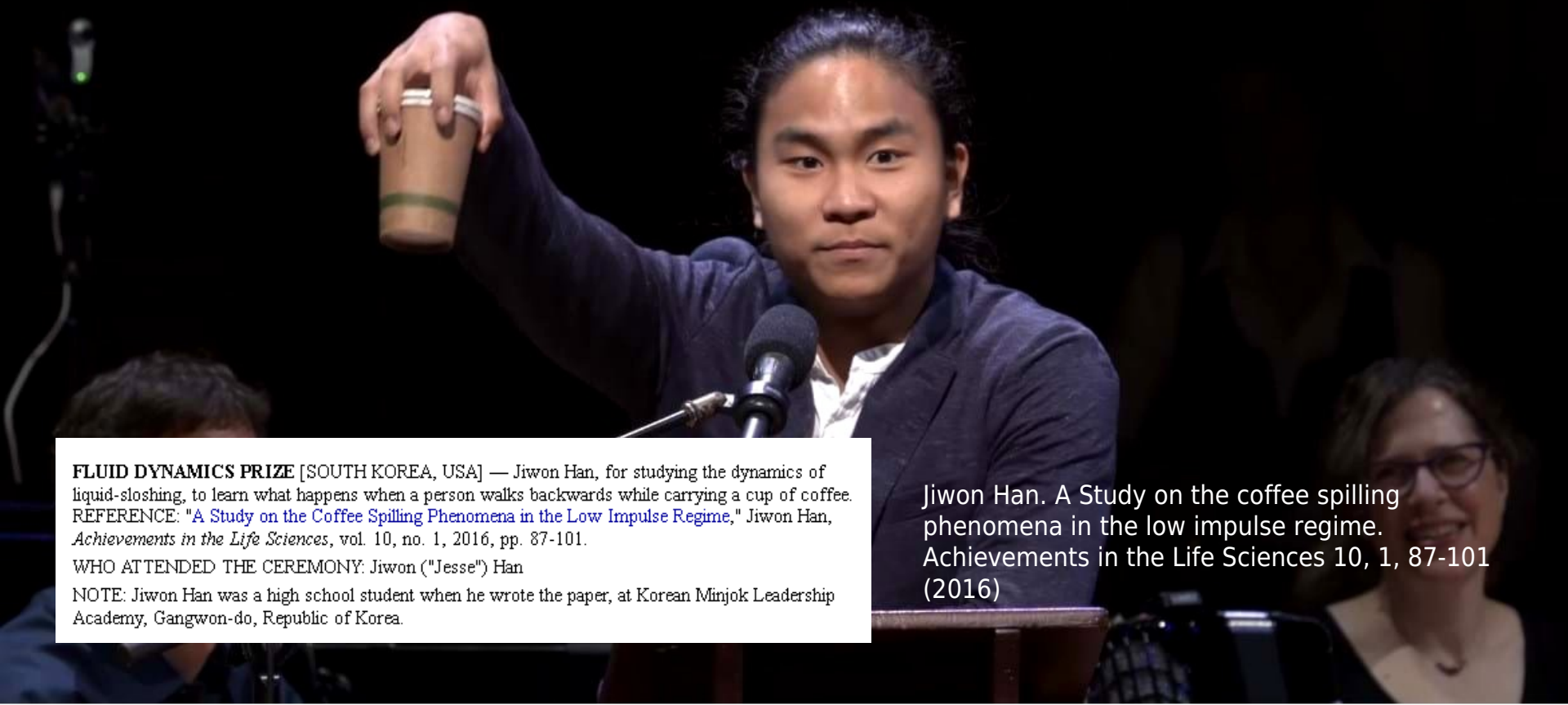
Preparation to the Young Physicists' Tournaments' 2018

Ilya Martchenko,[1]* Aleksandra Alorić,[2] Łukasz Gładczuk,[3] and Nikita Chernikov[4]

[1] Foundation for Youth Tournaments; [2] King's College London; [3] University of Oxford; [4] Novosibirsk State University

Congratulations: Jiwon Han

- Jiwon Han, Korean Captain at the 28th IYPT 2015, wins the 2017 Ig Noble Prize in Fluid Dynamics
- The winning, IYPT-driven paper is based on the solution for No. 17 “Coffee cup” (28th IYPT 2015)
- Jiwon Han has not reported the solution in Thailand but has opposed a Hungarian solution in PF 2
- This is the first Ig Noble Prize to any IYPT participant



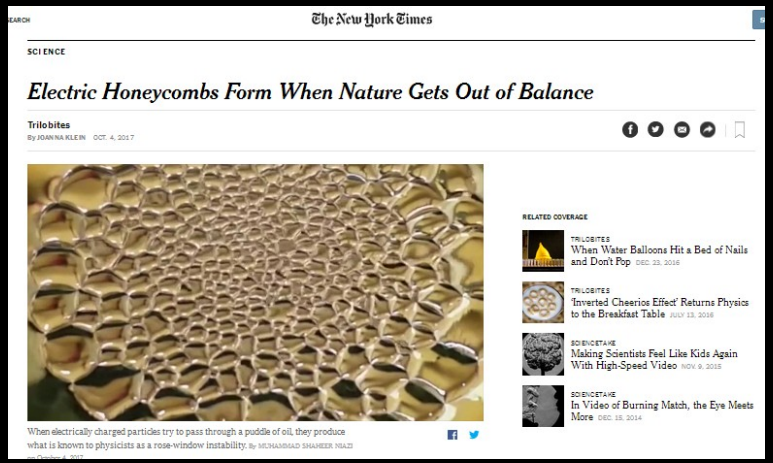
FLUID DYNAMICS PRIZE [SOUTH KOREA, USA] — Jiwon Han, for studying the dynamics of liquid-sloshing, to learn what happens when a person walks backwards while carrying a cup of coffee. REFERENCE: "A Study on the Coffee Spilling Phenomena in the Low Impulse Regime," Jiwon Han, *Achievements in the Life Sciences*, vol. 10, no. 1, 2016, pp. 87-101.

WHO ATTENDED THE CEREMONY: Jiwon ("Jesse") Han

NOTE: Jiwon Han was a high school student when he wrote the paper, at Korean Minjok Leadership Academy, Gangwon-do, Republic of Korea.

Jiwon Han. A Study on the coffee spilling phenomena in the low impulse regime. Achievements in the Life Sciences 10, 1, 87-101 (2016)

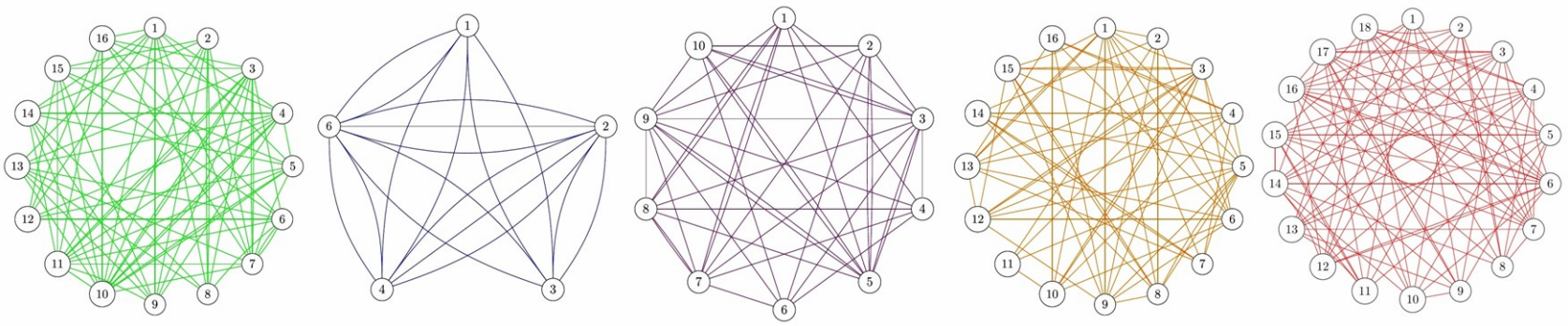
Congratulations:
Muhammad Shaheer Niazi



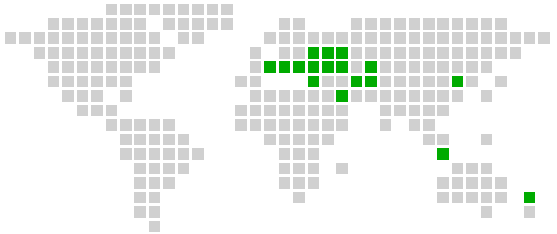
- Muhammad Shaheer Niazi, Pakistani Team Member at the 29th IYPT 2016, attracts major international media attention and coverage by BBC World and The New York Times in October 2017
- The IYPT-driven paper is based on the solution for Problem No. 6 “Electric honeycomb” at the 29th IYPT 2016
- The IYPT is acknowledged in the paper
- Muhammad Shaheer Niazi has reported the solution in Russia in Physics Fight 4

Muhammad Shaheer Niazi. The Electric Honeycomb; an investigation of the Rose window instability. R. Soc. open sci. 4, 170503 (2017)

Welcome to the 6th IYNT 2018 in Tbilisi



- The International Young Naturalists' Tournament, IYNT, is a whole new competition with breathtaking problems, state-of-the-art grading standards, and an impressive momentum
- The IYNT bridges gaps between natural sciences and is focused on participants aged 12 through 16
- The IYNT has so far attracted 65 teams from 17 different countries from Switzerland in the West to China in the East and from Russia in the North to New Zealand in the South; has given 6042 grades in 303 stages; and has awarded 39 medals
- Do not hesitate and pre-register today



http://iynt.org

Call for cooperation

- If you are interested in the idea behind the Kit — to structure the existing knowledge about the physics behind the problems and to encourage students to contrast their personal contribution from the existing knowledge — your cooperation is welcome
- If more contributors join the work on the Kit for 2018, or plan bringing together the Kit for 2019, good editions may be completed earlier
- It would be of benefit for everybody,
  - students and team leaders, who would have an early reference (providing a first impetus to the work) and a strong warning that IYPT is all about appropriate, novel research, and not about “re-inventing the wheel”
  - jurors, who would have a brief, informal supporting material, possibly making them more skeptical and objective about the presentations
  - the audience outside the IYPT, who benefits from the structured references in e.g. physics popularization activities and physics teaching
  - the IYPT, as a community and a center of competence, that generates vibrant, state-of-the-art research problems, widely used in other activities and at other events
  - and also the author (-s) of the Kit, who could rapidly acquire a competence for the future activities and have a great learning experience

How to tackle the IYPT problems?

- How to structure a report?
- What level is competitive?
- How to set the goals, fix the priorities, and set the direction of the work?
- How were people resolving particular issues in the past?

- Look through the historical solutions in the Archive
  - an opportunity for goal-oriented critical learning
  - examples, not guidelines
  - those solutions were good, but yours should be better!

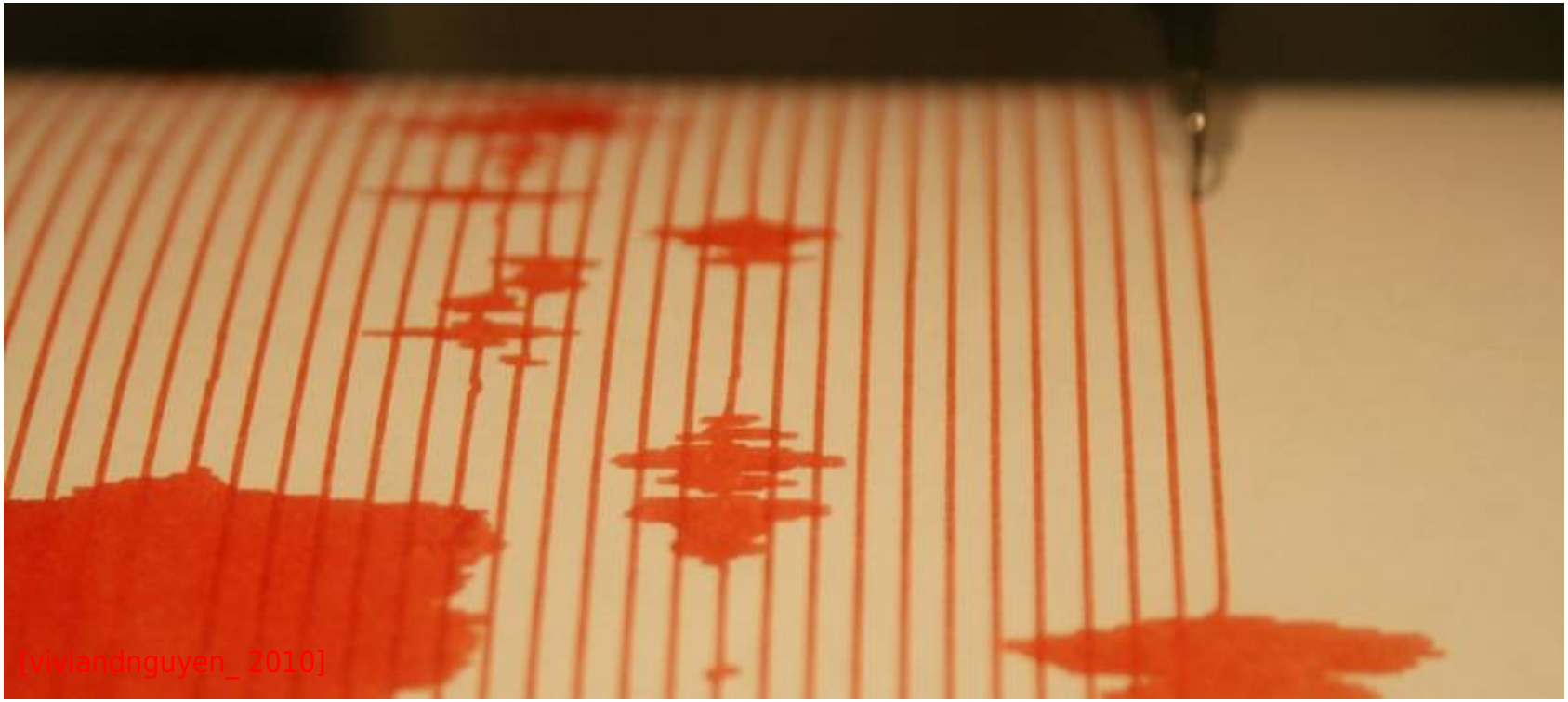
iypt archive mc^2 hv


Is the novel research limited and discouraged by the existing common knowledge and the ongoing work of competing groups? :-)

The originator of a new concept . . . finds, as a rule, that it is much more difficult to find out why other people do not understand him than it was to discover the new truths.

—Hermann von Helmholtz

* The epigraph for the problems selected by the IYPT Founder Evgeny Yunosov on July 13, 2017



Problem No. 1 “Invent yourself”

Construct a simple seismograph that amplifies a local disturbance by mechanical, optical or electrical methods. Determine the typical response curve of your device and investigate the parameters of the damping constant. What is the maximum amplification that you can achieve?

Background reading

- Wikipedia: Seismometer, https://en.wikipedia.org/wiki/Seismometer
- P. Bazanos. Building a seismograph from scrap. Science in School 23, 25-32 (2012), http://www.scienceinschool.org/sites/default/files/teaserPdf/issue23_earthquakes.pdf
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- R. L. Kroll. Construction modifications of the Lehman seismograph. J. Geolog. Educ. 35, 124-125 (1987)
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- Build Your Own Seismograph (berkeley.edu, 1995), http://cse.ssl.berkeley.edu/lessons/indiv/davis/hs/Seismograph.html
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Background reading

- This Seismometer Is No Toy! (barkergk, instructables.com), http://www.instructables.com/id/This-Seismometer-is-no-toy/
- Build a Beautiful Seismometer to Detect Quakes and Explosions (makezine.com), https://makezine.com/projects/make-experimental-optical-fiber-seismometer/
- Seismology Science Fair Project Ideas (iris.edu), https://www.iris.edu/hq/programs/epo/sciencefair
- Is There a Whole Lot of Shaking Going On? Make Your Own Seismograph and Find Out! (sciencebuddies.org), https://www.sciencebuddies.org/science-fair-projects/project-ideas/Geo_p017/geology/make-your-own-seismograph
- UPSeis: Michigan Technological University (geo.mtu.edu), http://www.geo.mtu.edu/UPSeis/index.html
- Seismograms of Interest (ncedc.org), http://www.ncedc.org/bdsn/seismograms_of_interest.html
- UK School Seismology: seismometer assembly (youtube, British Geological Survey, May 11, 2009), https://youtu.be/zogw8dl3fUQ
- How Does a Seismometer Work? (youtube, UC Berkeley, May 7, 2015), https://youtu.be/geNiqkgZDXA
- K&J Seismometer (youtube, KJMagneticsProducts, Mar 30, 2016), https://youtu.be/YfpuB-wAzT4
- Science Project Seismograph by Sanya of 8th class HMHS Ferozguda (youtube, Sukhdev Singh, Jan 16, 2017), https://youtu.be/C4wKpDbbLdU


[Marco Verch 2017]

Problem No. 2 “Colour of powders”

If a coloured material is ground to a powder, in some cases the resulting powder may have a different colour to that of the original material. Investigate how the degree of grinding affects the apparent colour of the powder.

Background reading

- Wikipedia: Diffuse reflection, https://en.wikipedia.org/wiki/Diffuse_reflection
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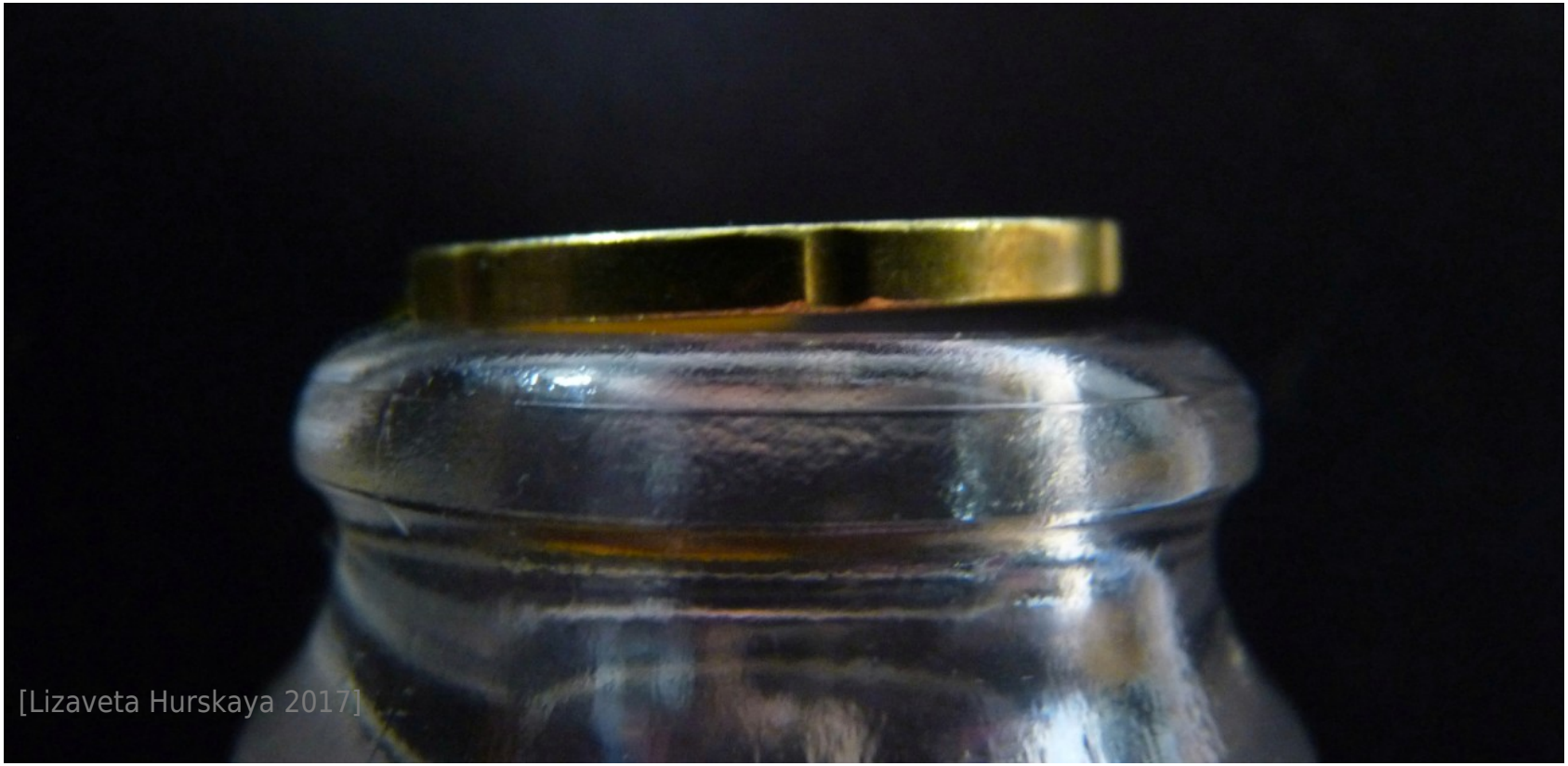
- the material attributes of paints (handprint.com, 2015), https://www.handprint.com/HP/WCL/pigmt3.html
- corn grinder mill, corn mill grinder, corn grinder for sale, maize milling machine (youtube, Lei Li, Dec 5, 2014), https://youtu.be/sByxd8pRCXY



Problem No. 3 “Dancing coin”

Take a strongly cooled bottle and put a coin on its neck. Over time you will hear a noise and see movements of the coin. Explain this phenomenon and investigate how the relevant parameters affect the dance.

Background reading

- Wikipedia: Gas laws, https://en.wikipedia.org/wiki/Gas_laws
- The Dancing Penny (umanitoba.ca), www.umanitoba.ca/outreach/crystal/resources%20for%20teachers/The%20Dancing%20Coin.doc
- Robert T. Bailey & Wayne L. Elban. Thermal performance of aluminum and glass beer bottles. J. Heat Transfer Eng. 29, 7, 643-650 (2008)
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- Jumping Coin (youtube, Amar Chitra Katha Pvt Ltd, Aug 19, 2013), https://youtu.be/20yD8PLCJ98
- Jumping Coin Experiment by Manman (youtube, Manman Isaac, Mar 20, 2014), https://youtu.be/y1aR0peVhWE
- Dancing Coin (youtube, Dorje Gurung, Apr 24, 2013), https://youtu.be/X0JkEigLbPo
- Coin jump up | Jumping coin trick revealed | Science experiment for kids (youtube, Elearnin, May 7, 2013), https://youtu.be/3TjcbvmjqIA
- Vibrating Coin experiment (youtube, Geraldine6824, Oct 5, 2014), https://youtu.be/E4bQ14_CQZA
- Dancing Penny Experiment (youtube, Joe Tarlizzo, Nov 24, 2014), https://youtu.be/64BjlAyoa3k

Background reading

- Vibrating Coins Experiment - Solids EC Project (youtube, Hamdi Sherif, Dec 4, 2014), https://youtu.be/WBQXfOU02EE
- Experiment Jumping coin (youtube, amev, Dec 12, 2015), https://youtu.be/1v-RnOzMw0o
- Jumping coin (youtube, 4SciFun, Feb 29, 2016), https://youtu.be/tYIo7CfYZMs
- Metal Ring on Dry Ice (youtube, Nicolas Chevalier, Jan 16, 2017), https://youtu.be/vBGmQrGKqf4

Problem No. 4 “Heron’s fountain”

Construct a Heron’s fountain and explain how it works. Investigate how the relevant parameters affect the height of the water jet.

Background reading

- Wikipedia: Heron's fountain, https://en.wikipedia.org/wiki/Heron%27s_fountain
- R. Ya. Kezerashvili and A. Sapozhnikov. Magic fountain (2003), arXiv:physics/0310039 [physics.ed-ph]
- A.-M. Georgescu, S.-C. Georgescu and L. Stroia. Heron's fountain demonstrator. Rev. Rom. Ing. Civ. 5, 2, 87-94 (2014)
- Hero's Fountain (physics.kenyon.edu), http://physics.kenyon.edu/EarlyApparatus/Fluids/Heros_Fountain/Heros_Fountain.html
- M. de Vinck. Build Heron’s Fountain (makezine.com, 2008), https://makezine.com/2008/06/08/build-herons-fountain-1/
- M. Shuttleworth. Make Heron’s Fountain (explorable.com, 2011), https://explorable.com/herons-fountain
- Геронов фонтан своими руками (virtuallab.by, 2014), http://virtuallab.by/publ/interesnye_stati/interesnye_stati/geronov_fontan_svoimi_rukami/2-1-0-92
- Новые героновы фонтаны // Я. Перельман. Занимательная физика. Книга 2, http://allforchildren.ru/sci/perelman2-60.php
- Heron's Fountain (youtube, Peter Harris, Oct 28, 2012), https://youtu.be/AK3w_K8uPvE
- Heron's Fountain Plastic Water Bottle 2 minute DIY no sealant, no glue (youtube, GREENPOWERSCIENCE, Mar 31, 2013), https://youtu.be/92rSXLPupKw

Background reading

- Heron's Fountain problem solved !!! (youtube, MunchausenTV, Aug 24, 2013), https://youtu.be/5_Pbb1Ywo18
- Heron's Fountain. Фонтан Герона (youtube, veproject1, Aug 25, 2013), https://youtu.be/Sv9JrnnZkLA
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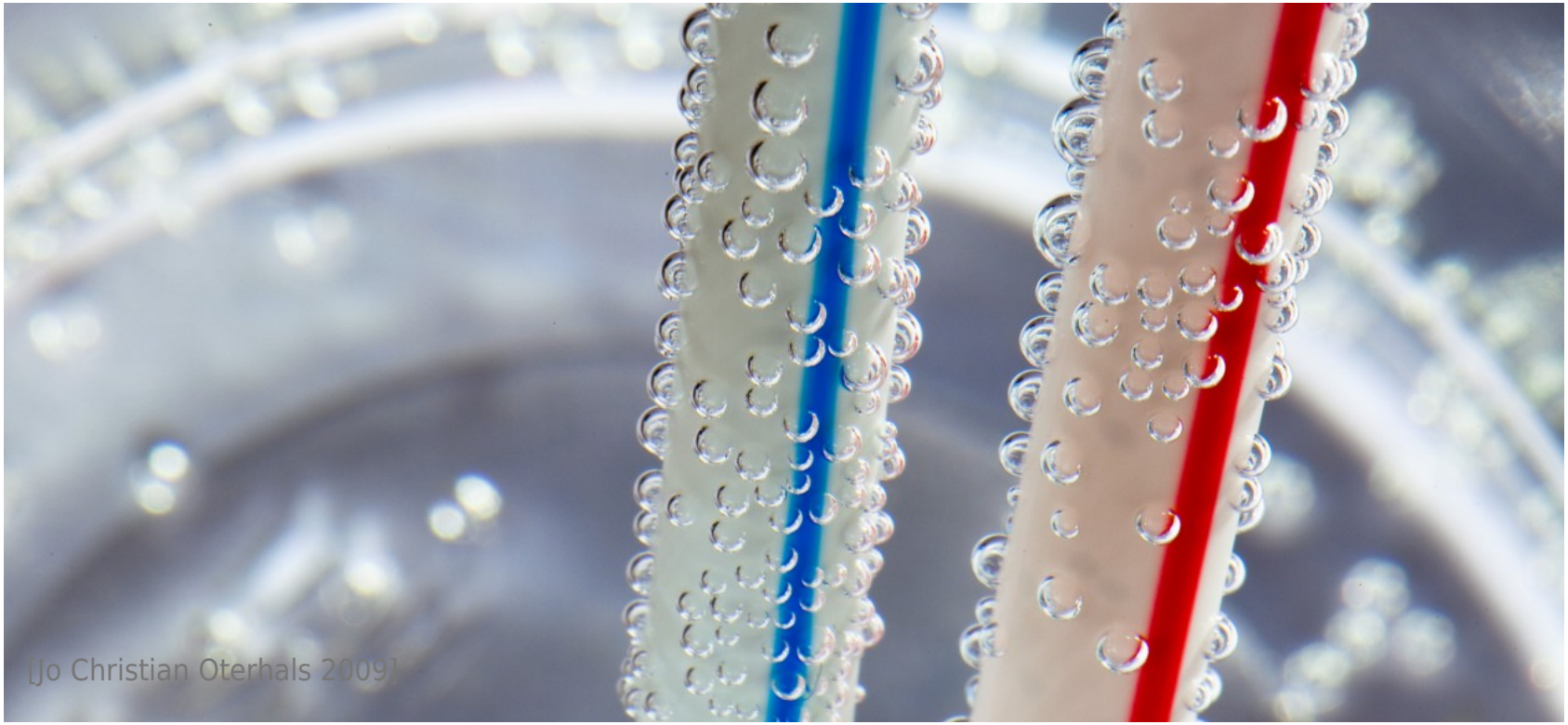
- How does heron's fountain work? (youtube, Nikolay Donov, Jul 9, 2015), https://youtu.be/pJHKZK8GVmQ
- Heron's Fountain Three Bottle Fountain (youtube, The Q, Feb 22, 2017), https://youtu.be/BmW1iZOAucs
- Make Non Stop Heron’s Fountain Using Three Coca Cola 400ml (youtube, Foregoing Tuber, Sep 18, 2017), https://youtu.be/ri1OH1gGJCg
- Heron’s Fountain : การสร้างน้ำพุของเฮอรอน (youtube, dekphysics, Nov 3, 2017), https://youtu.be/5JFCylEYTqQ



Problem No. 5 “Drinking straw”

When a drinking straw is placed in a glass of carbonated drink, it can rise up, sometimes toppling over the edge of the glass. Investigate and explain the motion of the straw and determine the conditions under which the straw will topple.

Background reading

- Wikipedia: Buoyancy, https://en.wikipedia.org/wiki/Buoyancy
- Why does a straw float so high in a bottle of Coke? (quora.com, 2012), https://www.quora.com/Why-does-a-straw-float-so-high-in-a-bottle-of-Coke
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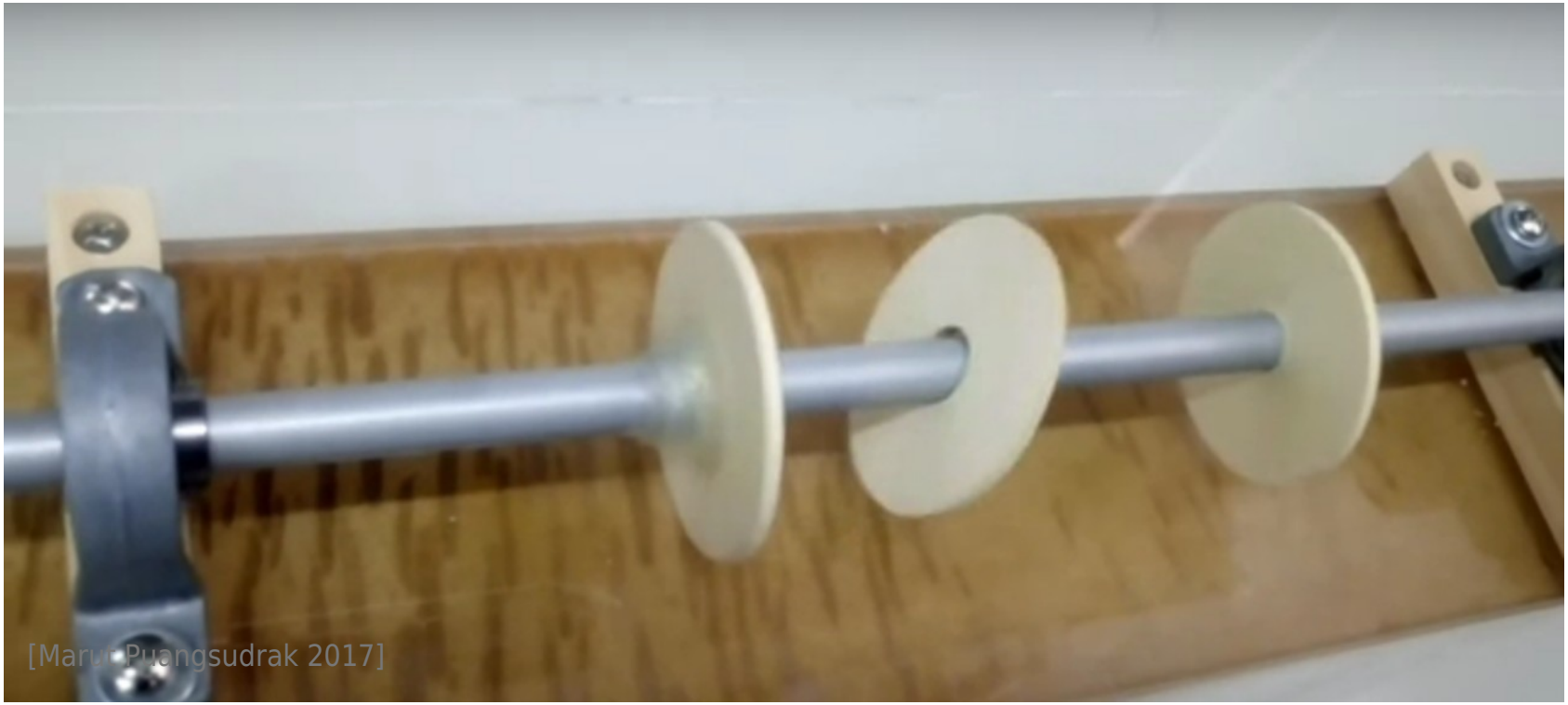
- W. Zijl. Departure of a bubble growing on a horizontal wall (Eindhoven Univ. Tech., 1978), https://pure.tue.nl/ws/files/3977093/33762.pdf
- STRAW RISES IN FULL GLASS OF COKE (youtube, Random Poop, Jan 3, 2017), https://youtu.be/BbwhTdFshH0



Problem No. 6 “Ring oiler”

An oiled horizontal cylindrical shaft rotates around its axis at constant speed. Make a ring from a cardboard disc with the inner diameter roughly twice the diameter of the shaft and put the ring on the shaft. Depending on the tilt of the ring, it can travel along the shaft in either direction. Investigate the phenomenon.

Background reading

- Wikipedia: Friction, https://en.wikipedia.org/wiki/Friction
- Ring Oiler @ Greenwich Village (youtube, iyptchile, Feb 22, 2017), https://youtu.be/FXULCKpbQWI
- Ring in the rotate rod (youtube, Marut Puangsudrak, Aug 16, 2017), https://youtu.be/g46lTMAmNcc
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- IYPT Ring Oiler (youtube, 윤재훈 , Oct 8, 2017), https://youtu.be/a7H60rdsTDw

Problem No. 7 “Conical piles”

Non-adhesive granular materials can be poured such that they form a cone-like pile. Investigate the parameters that affect the formation of the cone and the angle it makes with the ground.

Background reading

- Wikipedia: Angle of repose, https://en.wikipedia.org/wiki/Angle_of_repose
- Wikipedia: Abelian sandpile model, https://en.wikipedia.org/wiki/Abelian_sandpile_model
- H. J. Herrmann. On the shape of a sandpile. In: Physics of Dry Granular Media (Eds. H. J. Hermann et al., Kluwer 1998), pp. 319-338, http://www.comphys.ethz.ch/hans/p/224.pdf
- J. Duran, A. Reisinger. Sands, powders, and grains: An introduction to the physics of granular materials (Springer-Verlag New York, 1999)
- R. L. Brown and J. C. Richards. Principles of powder mechanics (Pergamon Press, Oxford, 1970)
- H. M. Jaeger, Ch.-h. Liu, and S. R. Nagel. Relaxation at the angle of repose. Phys. Rev. Lett. 62, 1-2, 40-43 (1989)
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- A. Mehta and G. C. Barker. The dynamics of sand. Reports on Prog. in Phys. 57, 383-416 (1994)
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- Y. C. Zhou, B. H. Xu, A. B. Yu, and P. Zulli. Numerical investigation of the angle of repose of monosized spheres. Phys. Rev. E 64, 021301 (2001), http://ro.uow.edu.au/cgi/viewcontent.cgi?article=7733&context=eispapers

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- N. Yoshioka. A sandpile experiment and its implications for self-organized criticality and characteristic earthquake. Earth Planets Space 55, 283–289 (2003), http://www.johnboccio.com/courses/SOC26/55060283.pdf
- S. Nowak, A. Samadani, and A. Kudrolli. Maximum angle of stability of a wet granular pile. Nature Physics 1, 50-52 (2005), arXiv:cond-mat/0508352v1 [cond-mat.other]
- N. A. Pohlman, B. L. Severson, J. M. Ottino, and R. M. Lueptow. Surface roughness effects in granular matter: Influence on angle of repose and the absence of segregation. Phys. Rev. E, 73, 031304 (2006)
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- I. Peterson. Dry sand, wet sand. Digging into the physics of sandpiles and sand castles. Science News, 152, 12, 186 (1997), http://www.sciencenews.org/pages/pdfs/data/1997/152-12/15212-16.pdf
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- Stephen A. Nelson. Slope Stability, Triggering Events, Mass Movement Hazards (tulane.edu, 2013), http://www.tulane.edu/~sanelson/Natural_Disasters/slopestability.htm

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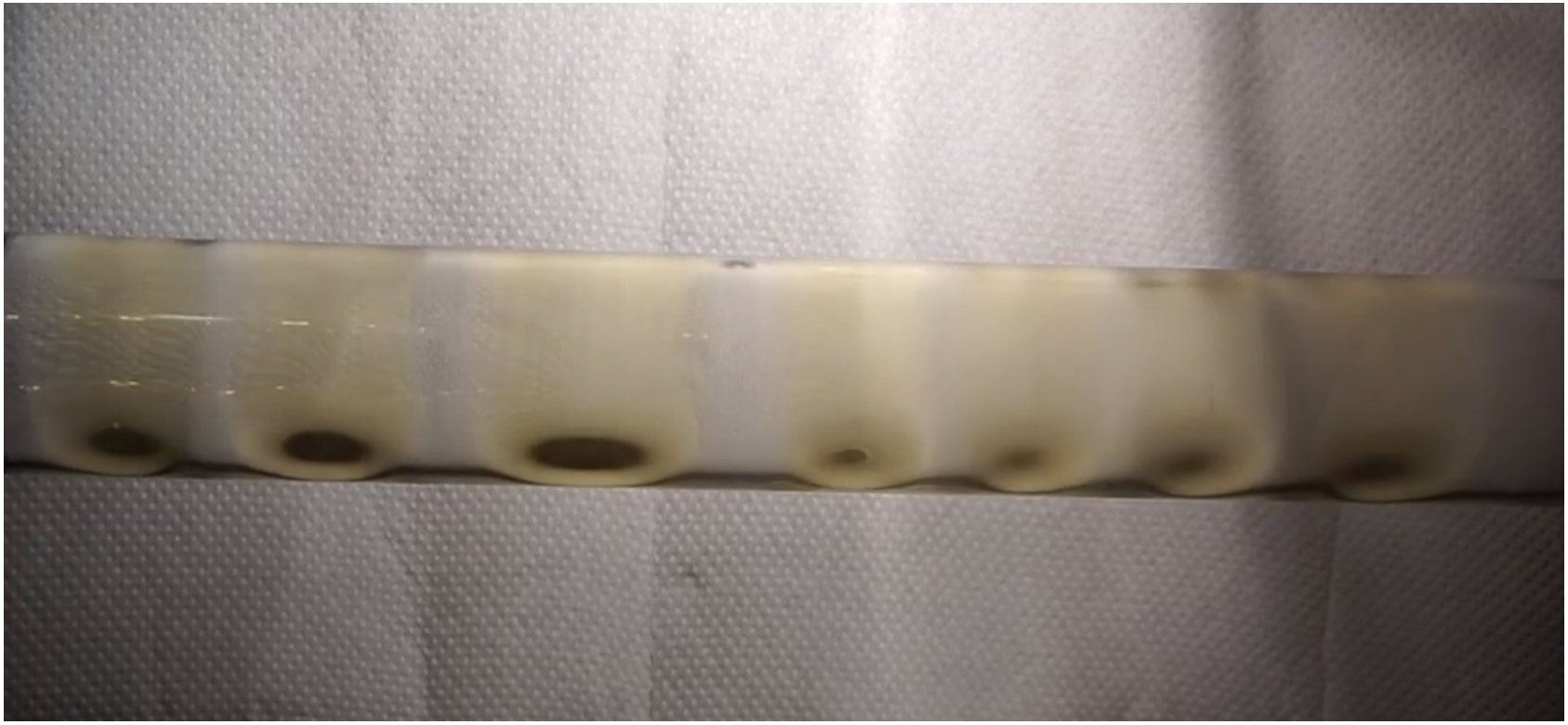
- アングル・オブ・リポーズ： Angle of repose（安息角） (youtube, S. Isaji, Oct 4, 2011), https://youtu.be/Rmu0lTi9hYU
- Flowability test of Granular inoculants (youtube, beckerunderwood, Sep 17, 2012), https://youtu.be/mMsDK0myWkk
- Granular Materials at Peddie #6 - Avalanches and Angle Of Repose (youtube, PeddiePhysics, Dec 18, 2013), https://youtu.be/QVYjqaekahU
- DEM Slump test (youtube, Simphysics, May 23, 2014), https://youtu.be/iP81DNySJzY
- Sand experiment 1: angle of repose (youtube, The Art of Tracking, Dec 10, 2014), https://youtu.be/nf9rXcCR9Dw
- Angle of repose…Physics of toys // Homemade Science with Bruce Yeany (youtube, Bruce Yeany, Feb 20, 2016), https://youtu.be/7UM5R-oMBHc



Problem No. 8 “Cusps in a cylinder”

A horizontal cylinder is partially filled with a viscous fluid. When the cylinder is rotated around its axis, unusual fluid behaviour can be observed, such as cusp-like shapes on the walls of the cylinder. Investigate the phenomenon.

Background reading

- Wikipedia: Hydrodynamic stability, https://en.wikipedia.org/wiki/Hydrodynamic_stability
- S. T. Thoroddsen and L. Mahadevan. Experimental study of coating flows in a partially-filled horizontally rotating cylinder. Exp. Fluids 23, 1-13 (1997), https://www.seas.harvard.edu/softmat/downloads/pre2000-13.pdf
- A. E. Hosoi and L. Mahadevan. Axial instability of a free-surface front in a partially filled horizontal cylinder. Phys. Fluids 11, 1, 97-106 (1999)
- R. Chicharro, A. Vazquez, and R. Manasseh. Characterization of patterns in rimming flow. Exp. Therm. Fluid Sci. 35, 6, 1184-1192 (2011)
- V. Dyakova, V. Kozlov, and D. Polezhaev. Pattern formation inside a rotating cylinder partially filled with liquid and granular medium. Shock and Vibration 841320 (2014)
- V. Kozlov and D. Polezhaev. Flow patterns in a rotating horizontal cylinder partially filled with liquid. Phys. Rev. E 92, 1, 013016 (2015)
- Rimming flow of a viscous fluid in a horizontal rotating tube (youtube, Stephen Morris, Apr 11, 2011), https://youtu.be/7VwkBtHrXKY

Problem No. 9 “Candle in water”

Add some weight to a candle such that it barely floats in water. As the candle burns, it may continue to float. Investigate and explain this phenomenon.

Background reading

- Wikipedia: Buoyancy, https://en.wikipedia.org/wiki/Buoyancy
- Wikipedia: Candle, https://en.wikipedia.org/wiki/Candle
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Problem No. 10 “Tesla valve”

A Tesla valve is a fixed-geometry, passive, one-direction valve. A Tesla valve offers a resistance to flow that is much greater in one direction compared to the other. Create such a Tesla valve and investigate its relevant parameters.

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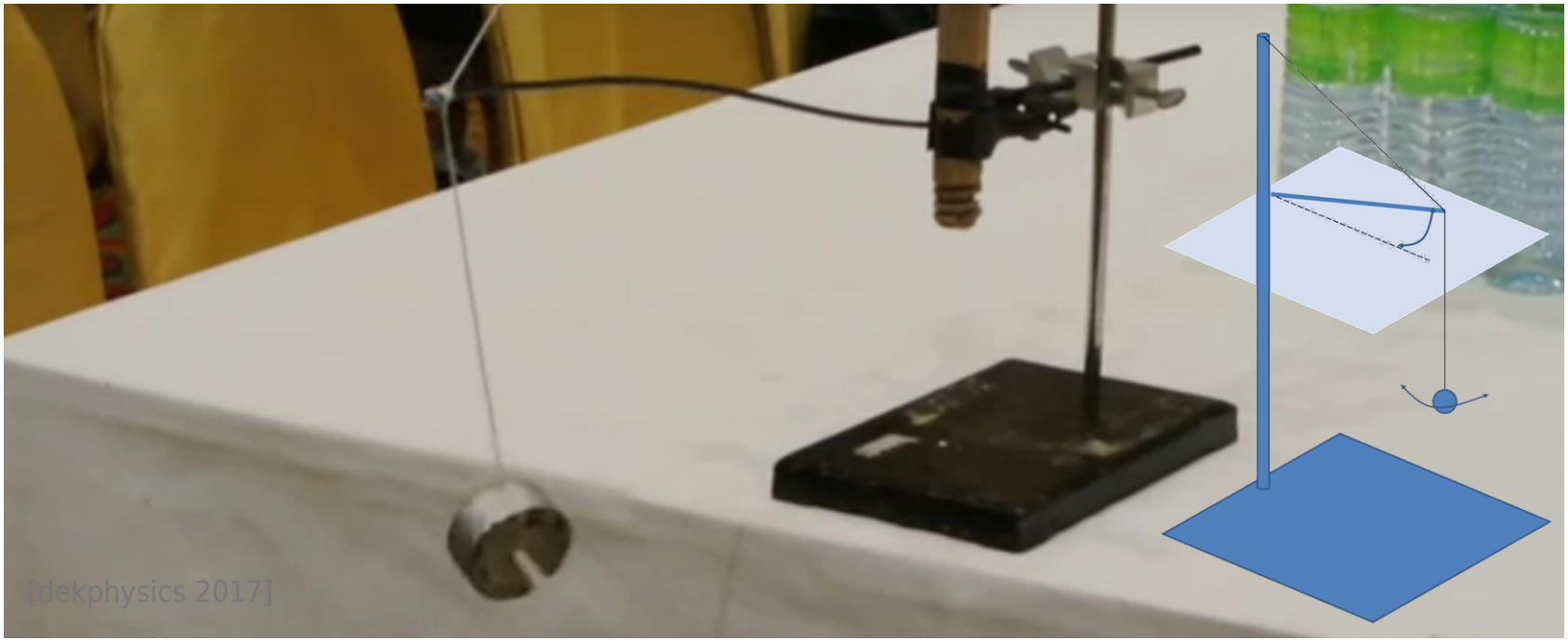

Prob. No. 11 “Azimuthal-radial pendulum”

Fix one end of a horizontal elastic rod to a rigid stand. Support the other end of the rod with a taut string to avoid vertical deflection and suspend a bob from it on another string (see figure). In the resulting pendulum the radial oscillations (parallel to the rod) can spontaneously convert into azimuthal oscillations (perpendicular to the rod) and vice versa. Investigate the phenomenon.

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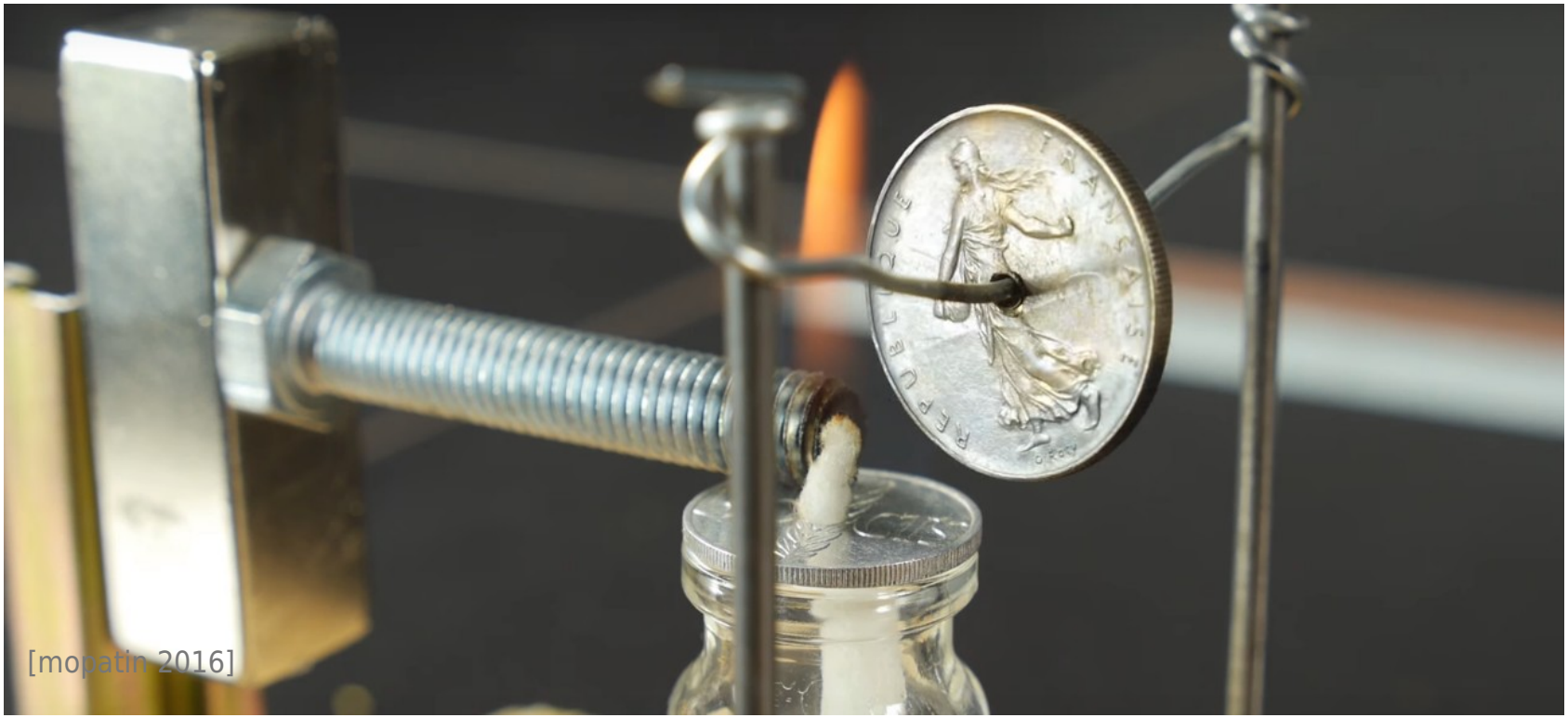

Problem No. 12 “Curie point engine”

Make a nickel disc that can rotate freely around its axis. Place a magnet near the edge of the disc and heat this side of it. The disc starts to rotate. Investigate the parameters affecting the rotation and optimize the design for a steady motion.

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Problem No. 13 “Weighting time”

It is commonly known that an hourglass changes its weight (as measured by a scale) while flowing. Investigate this phenomenon.

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Problem No. 14 “Radiant lantern”

When taking a picture of a glowing lantern at night, a number of rays emanating from the centre of the lantern may appear in the pictures. Explain and investigate this phenomenon.

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Problem No. 15 “Blowing bubbles”

When blowing on a soap film in a ring, a bubble may be formed. The liquid film may pop or continue to exist. Investigate how the number of bubbles produced from a single soap film and the characteristics of the bubbles depend on the relevant parameters.

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Problem No. 16 “Acoustic levitation”

Small objects can levitate in acoustic standing waves. Investigate the phenomenon. To what extent can you manipulate the objects?

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- Tractorbeam mit Ultraschall (youtube, ibnews, Jan 27, 2017), https://youtu.be/ZYKiXBVpO78
- Ultrasonic Levitation (youtube, Harvard Natural Sciences Lecture Demonstrations, Feb 23, 2017), https://youtu.be/XpNbyfxxkWE
- TinyLev small (youtube, N+1 видео, Aug 17, 2017), https://youtu.be/QuIZq_U6EoE
- 1st attempt of acoustic levitation with TinyLev (youtube, Leviator, our take of acoustic levitation, Nov 2, 2017), https://youtu.be/Ql2BKOBJNhU

Problem No. 17 “Water bottle”

The current craze of water bottle flipping involves launching a partially filled plastic bottle into the air so that it performs a somersault before landing on a horizontal surface in a stable, upright position. Investigate the phenomenon and determine the parameters that will result in a successful flip.

Background reading

- Wikipedia: Bottle flipping, https://en.wikipedia.org/wiki/Bottle_flipping
- It's flipping great to think like a physicist (iopblog.org, 2016), http://www.iopblog.org/its-flipping-great-to-think-like-a-physicist/
- The water bottle flip (iop.org, 2016), http://www.iop.org/resources/topic/archive/water-bottle-flip/page_68405.html
- The complex physics of that viral water bottle trick, explained (vox.com, 2016), https://www.vox.com/2016/5/26/11785562/water-bottle-flip-physics
- This Week in Making: Lego Tape, A Bottle-Flipping Robot, Lab Grown Chicken Strips, and More (makezine.com, 2017), https://makezine.com/2017/03/19/this-week-in-making-lego-tape-bottle-flipping-robot-lab-grown-chicken-strips-and-more/
- Senior Talent Show Water Bottle Flip AK 2016 (youtube, Arlington Johnson, May 24, 2016), https://youtu.be/GdUVtEeg9I4
- Epic Water Bottle Flip | How Ridiculous (youtube, How Ridiculous, Jun 30, 2016), https://youtu.be/fbaB8sSe3YA
- Water Bottle Flip Edition | Dude Perfect (youtube, Dude Perfect, Jul 18, 2016), https://youtu.be/P8V_bx0L4RY
- The Science of the Water Bottle Flip (youtube, West Foster, Sep 14, 2016), https://youtu.be/H33XcSAGfPg
- Water Bottle Flip Trick Shots 2 | That's Amazing (youtube, That's Amazing, Sep 20, 2016), https://youtu.be/G9P2iUS2oFE

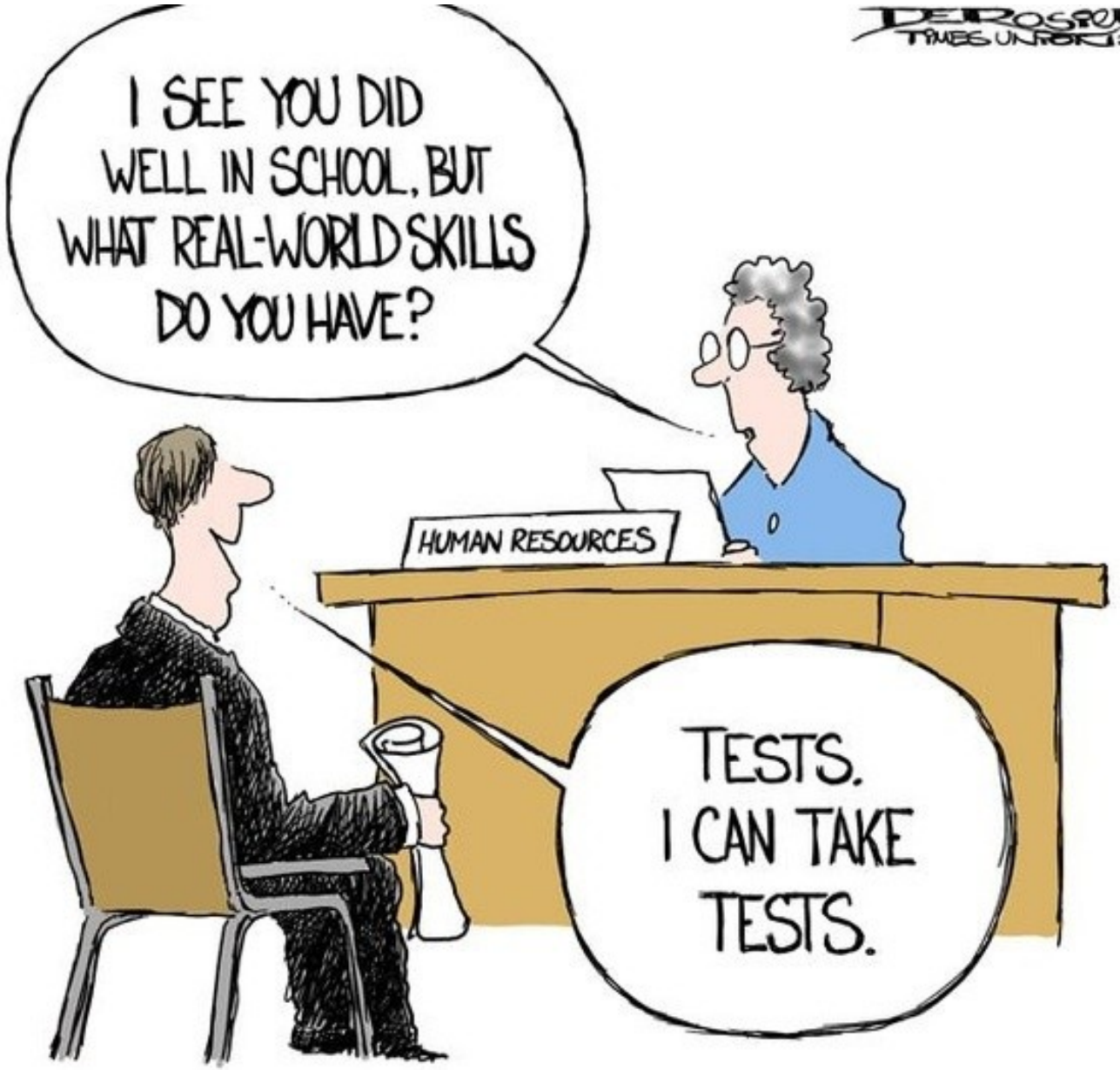
Background reading

- Water bottle-flip challenge (youtube, Institute of Physics, Oct 13, 2016), https://youtu.be/9XOcUAY9qvw
- THE WATER BOTTLE FLIP MACHINE (youtube, DaksDominos, Oct 26, 2016), https://youtu.be/0tWUmIwCrCU
- The Water Bottle Flip Machine! (youtube, berlagawesome, Nov 5, 2016), https://youtu.be/i-qBV06bBQY
- Game Theory: CHEAT the Water Bottle Flip Challenge...with SCIENCE! (youtube, The Game Theorists, Jan 17, 2017), https://youtu.be/amIdFq-nG8U
- Bottle Flip Machine!!!!! (youtube, RyeFields, Jan 8, 2017), https://youtu.be/C8ggM1qXSpA
- This K'NEX machine perfected the bottle flip challenge (youtube, Tech Insider, Apr 7, 2017), https://youtu.be/70CVlVx0NX0
- IYPT1295839948 (youtube, G_Kn, Sep 3, 2017), https://youtu.be/LQATZbGMJk8

Find all the differences you can!

IYPT 1989, Team Netherlands

IYPT 2016, Team United Kingdom


DEROSSO '20
TIMES UNION 2012
I SEE YOU DID WELL IN SCHOOL, BUT WHAT REAL-WORLD SKILLS DO YOU HAVE?
HUMAN RESOURCES
TESTS. I CAN TAKE TESTS.

The ultimate response to all "What for?"-questions:

" If we knew what we were doing,
it wouldn't be called research! "

Albert Einstein

Important information

- The basic goal of this Kit is not in providing students with a start-to-finish manual or in limiting their creativity, but in encouraging them to
  - regard their work critically,
  - look deeper,
  - have a better background knowledge,
  - be skeptical in embedding their projects into the standards of professional research,
  - and, as of a first priority, be attentive in not “re-inventing the wheel”
- An early exposure to the culture of scientific citations, and developing a responsible attitude toward making own work truly novel and original, is assumed to be a helpful learning experience in developing necessary standards and attitudes
- Good examples are known when the Kit has been used as a concise supporting material for jurors and the external community; the benefits were in having the common knowledge structured and better visible
- Even if linked from iypt.org, this file is not an official, binding release of the IYPT, and should under no circumstances be considered as a collection of authoritative “musts” or “instructions” for whatever competition
- Serious conclusions will be drawn, up to discontinuing the project in its current form, if systematic misuse of the Kit is detected, such as explicit failure of citing properly, replacing own research with a compilation, or interpreting the Kit itself as a binding “user guide”
- All suggestions, feedback, and criticism about the Kit are warmly appreciated :-)

Habits and customs

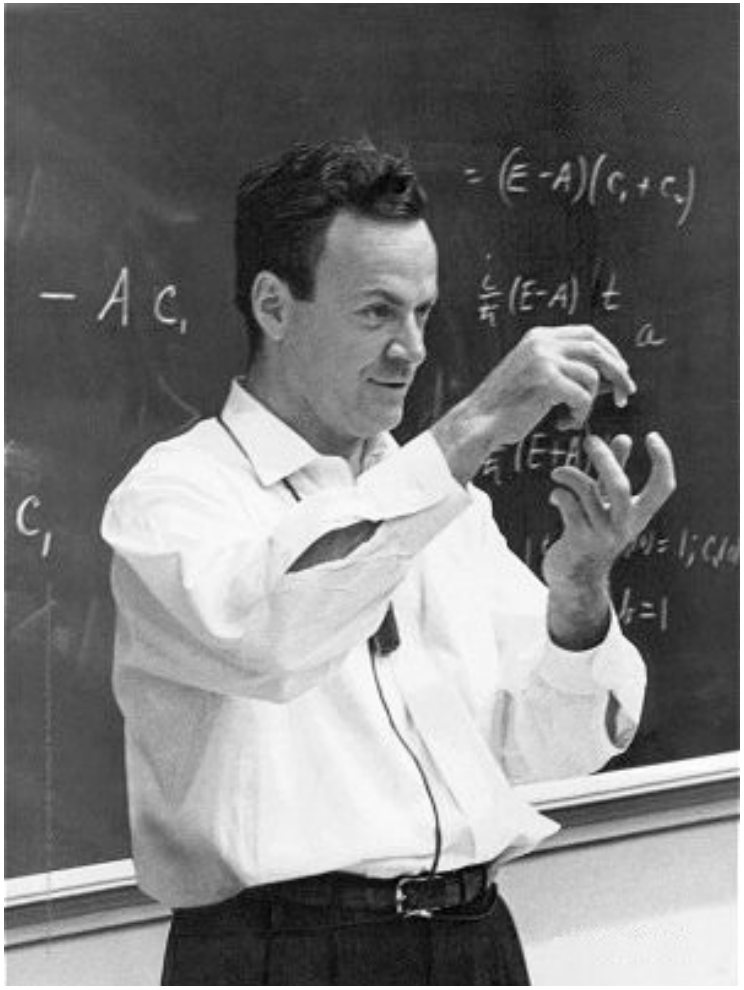
- Originality and independence of your work is always considered as of a first priority
- There is no “correct answer” to any of the IYPT problems
- Having a deep background knowledge about earlier work is a must
- Taking ideas without citing is a serious misconduct
- Critically distinguishing between personal contribution and common knowledge is likely to be appreciated
- Reading more in a non-native language may be very helpful
- Local libraries and institutions can always help in getting access to paid articles in journals, books, and databases
- The IYPT is not about reinventing the wheel, or innovating, creating, discovering, and being able to contrast own work with earlier knowledge and the achievements of others?
- Is IYPT all about competing, or about developing professional personal standards?

Requirements for a successful IYPT report

- Novel research, not a survey or a compilation of known facts
- Balance between experimental investigation and theoretical analysis
- Comprehensible, logical and interesting presentation, not a detailed description of everything-you-have-performed-and-thought-about
- Clear understanding of the validity of your experiments, and how exactly you analyzed the obtained data
- Clear understanding of what physical model is used, and why it is considered appropriate
- Clear understanding of what your theory relies upon, and in what limits it may be applied
- Comparison of your theory with your experiments
- Clear conclusions and clear answers to the raised questions, especially those in the task
- Clear understanding of what is your novel contribution, in comparison to previous studies
- Solid knowledge of relevant physics
- Proofread nice-looking slides
- An unexpected trick, such as a demonstration *in situ*, will always be a plus

Feynman: to be self-confident?

- “I’ve very often made mistakes in my physics by thinking the theory isn’t as good as it really is, thinking that there are lots of complications that are going to spoil it
- — an attitude that anything can happen, in spite of what you’re pretty sure should happen.”



R.P. Feynman. Surely You’re Joking, Mr. Feynman (Norton, New York, NY, 1985)

International Young Naturalists' Tournament

Pre-register a team!

HOME | ABOUT IYNT | GENERAL COUNCIL | FOUNDATION | TBILISI 2018 | CONTACT

About the IYNT

Check the breathtaking problems!

Introduction

The IYNT is an inclusive educational network and a prestigious international competition. The IYNT is focused on student participants aged 12 through 16, the age group that has not yet chosen their favorite area of knowledge (physics

Short links

- PROBLEMS 2018
- IYNT REGULATIONS
- PRE-REGISTRATION 2018

What is a Naturalist?

In their *Treatise on Natural Philosophy* (1867), Lord Kelvin and Tait give the definitions of matter,

Preparation to 31st IYPT' 2018: references, questions and advices

Photos by Alexey Cheremisin used on the cover with kind permission

Ilya Martchenko, [1] * Aleksandra Alorić, [2]
Łukasz Gładczuk, [3] and Nikita Chernikov [4]

[1] Foundation for Youth Tournaments; [2] King's College London;
[3] University of Oxford; [4] Novosibirsk State University

July 13, 2017...November 19, 2017

* to whom correspondence should be addressed:
ilya.martchenko@iypt.org http://ilyam.org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