TEACHING PHYSICS BY EXPERIMENTS

in the Polytechnic University of Bucharest

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Allegation:

- We live in a technological society where fewer and fewer pupils want to follow **HARD** scientific studies

Corollaries, or sometimes causes :

- - Society and parents are less interested in scientific or technical studies
- - Pupils follow humanities, economic or law faculties
- - They come from secondary schools with less skills in maths and physics

Conditions in engineering education:

- engineers require less and less undergraduate physics courses, even if they recognize the importance of an introductory physics course in developing problem solving skills.

(Engineering Criteria 2000, APS)

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Physics chapters

- Mechanics: kinematics, dynamics, oscillations and waves, special relativity
- Thermodynamics: principles, methods, statistical physics
- Electromagnetism: Fields, Maxwell equations
- Optics: e.m. waves, polarization, reflection, refraction, interference, diffraction, holography
- Modern physics: atomic and nuclear physics, quantum theory, lasers, solid state physics

Good points

- Application of mathematics
- Modern applications: light fibers,
- semi-conductors, nanomaterials,

  heavy ion therapy, liquid crystals, nonlinear dynamics
- Experiments: 60 new experiments, 20 of them computer assisted
- Scientific research

What should we not do:

- A. Physics before mathematics
- B. Lectures without tutorials
- C. Lectures without laboratories
- I personally did A and B

How could we attract pupils ?

- Less theory,
- fewer demonstrations,
- more particular situations

- More modern applications

- Experiments: - in the laboratory
  - *- during lectures*

Situation:

- Students in Electronics with:
  - - fair theoretical background
  - - lack of experimental skills,
  - *some never saw an experiment in physics*

The importance of your work

- - pupils acquire experimental abilities
- - students grasp new aspects of phenomena
- - they are more confident

Examples of Hands on Physics Experiments

- - Inertia
- - Buoyancy
- - Kinetic momentum
- - Total reflection

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- **La Salle de Découvertes Scientifiques de Vaulx-en-Velin**

- Mail: vaulx@ebulliscience.com

Interactive science experiments in Bucharest ?

- On the land of PUB
- Help from: PUB, Ministry of Education, Scientific World,

  City Hall, Industry