Khemis Miliana University
Faculty of Science and Technology
Department of Sciences of the Matter

جامعة الجيلالي بونعامة خميس مليانة
كلية العلوم والتكنولوجيا
قسم علوم المادة

L1 Sciences of the Matter

Simple Physical Systems

Discovery Teaching Unit

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2023/2024

Outline

- What should you know about the SM course study ?
- What is a physical system ?
- Few examples about simple physical systems
- How we will do it ?
- Why it is important ?

What should you know about the SM course study ?

- **The cursus: SM : Licence (3 years) + Master (2 years) + Doctorat (3-5 years)**
- **Licence (Bachelor): L1SM (common core modules) → Choice application:**
  - **L2/L3 Fondamental Physics**
  - L2/L3 Fondamental Chemistry
- **Master : at Khemis Miliana University:**
  - **Applied Physics, Theoretical Physics**
  - Pharmaceutical chemistry
  - **Other algerian universities:**
  - Medical Physics, Energy Physics, Radiation Physics, Material Physics, Nanotechnology, …

What should you know about the SM course study ?

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- **Licence (Bachelor): L1SM**

	Semestre 1							
	UEF11			UEM11			UED11	UET11
Matière	Phys1	Math1	Chim1	TP Méca.	TP Chim1	Info. 1	Sys. Phys. Sim	Langue 1
Crédit	6	6	6	2	2	4	2	2
	18 (60%)			8 (27%)			4 (13%)	
	30 (100%)							
Coeff.	3	3	3	1	1	2	1	1
	9			4			2	
	15							

What should you know about the SM course study ?

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	Semestre 2							
	UEF21			UEM21			UED21	UET21
Matière	Phys2	Math2	Chim2	TP Elec.	TP Chim2	Info. 2	ENR	Langue 2
Crédit	6	6	6	2	2	4	2	2
	18 (60%)			8 (27%)			4 (13%)	
	30 (100%)							
Coeff.	3	3	3	1	1	2	1	1
	9			4			2	
	15							

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Admission in 2nd year (L2): (C.C : continous monitoring, Exams: final or resit)

- **Obtention of 60 credits (30 credits/semester):**
  - Obtention of each module credit: grade >= 10.00 per module (mean note: C.M/Exam, Exam or C.M)
  - Obtention of teaching units (UEF, UEM, UED, UET): mean score of each TU >= 10.00 (1st level compensation)
  - Obtention of the semester: mean score of the semester >= 10.00 (2nd level Compensation)
  - Obtention of the whole academic year: annual mean score >= 10.00 (3rd level Compensation)
- **Obtention of 45 credits minimum: transition with debts**
  - Obtention of 45 credits distributed between sem 1 and sem 2 : due subjects will be passed again during L2 (Exam & CM)

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- **Licence (Bachelor): L1SM**

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	9			4			2	
	15							

What is a physical system ?

A physical system is defined by a set of material objects, governed by a set of laws expressing the interactions between the system components, and between the system itself and its environment.

To identify well a given system to be analysed, it is very important to define the limits which separate this system from its surrounding environment, and the exsiting interaction with it.

What is a physical system ?

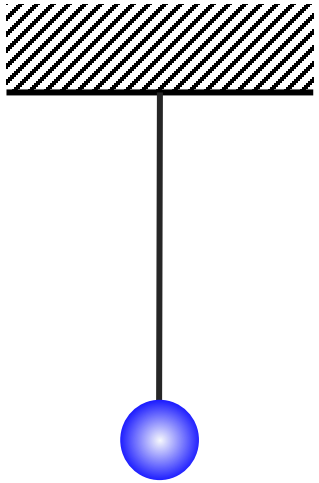
Three main kinds of physical systems could be identified according to their interaction with their environment:

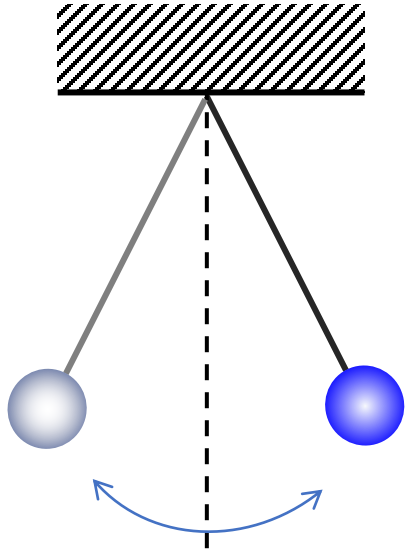
- **Isolated system:** no exchange with external environment
- **Closed system:** energy exchange only
- **Open System:** energy and matter exchange

Few examples about simple physical systems

- **The Simple pendulum (Oscillator):**

This is a physical system made from a weight suspended to one end of a wire or a rigid stick, and the second end it attached to a fixed point. The whole system (weight + wire) could oscillate freely around an equilibrium position.

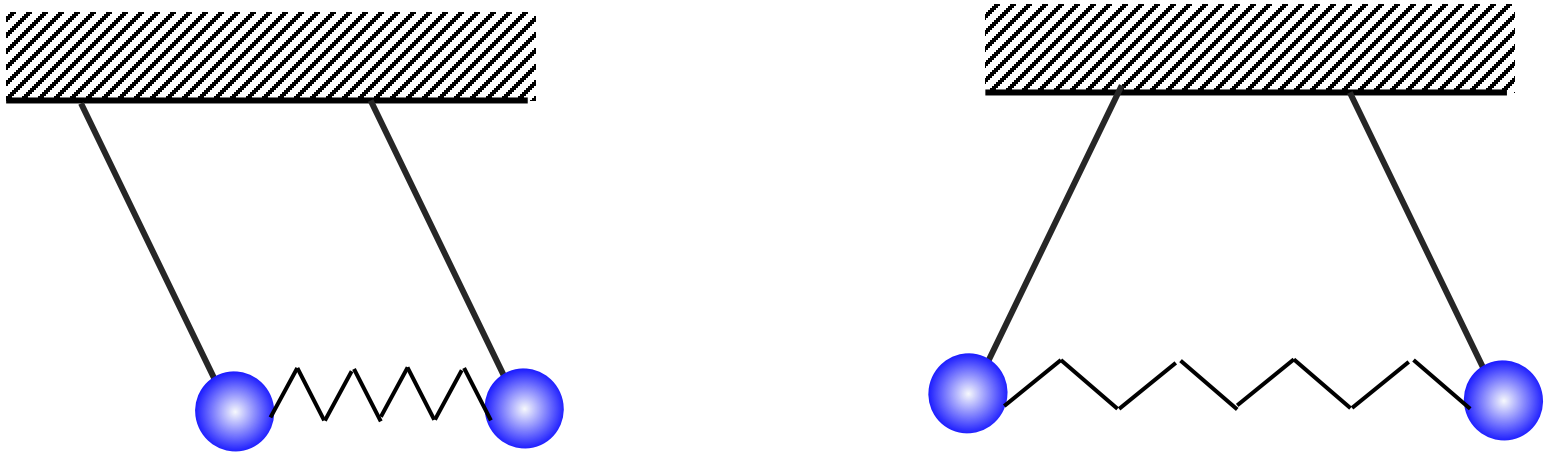




Few examples about simple physical systems

- **Resonant Oscillator:**

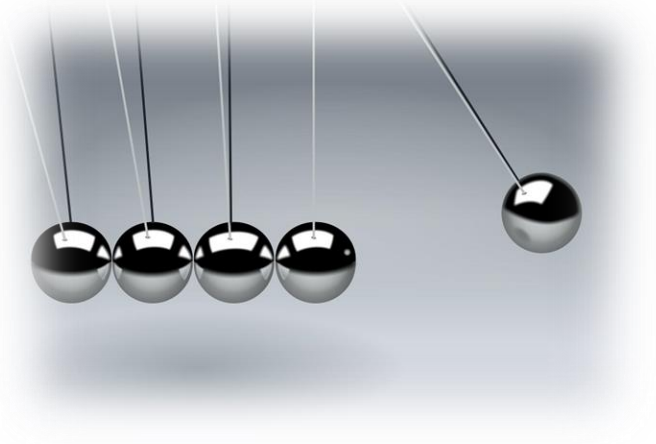
This system is made from at least two interconnected oscillators (simple pendulum). They could reach a maximal amplitude which corresponds to the resonance of the system.

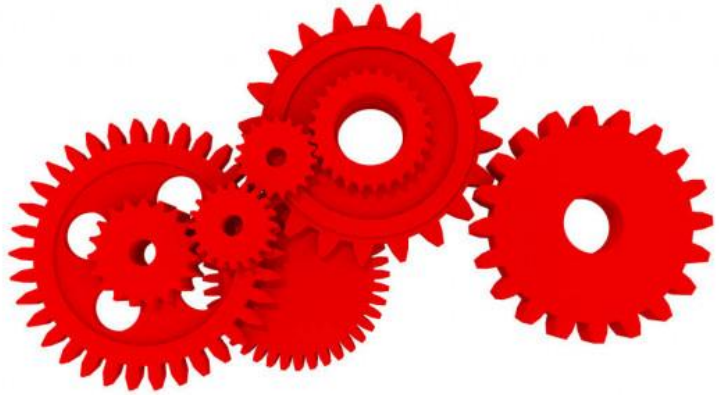


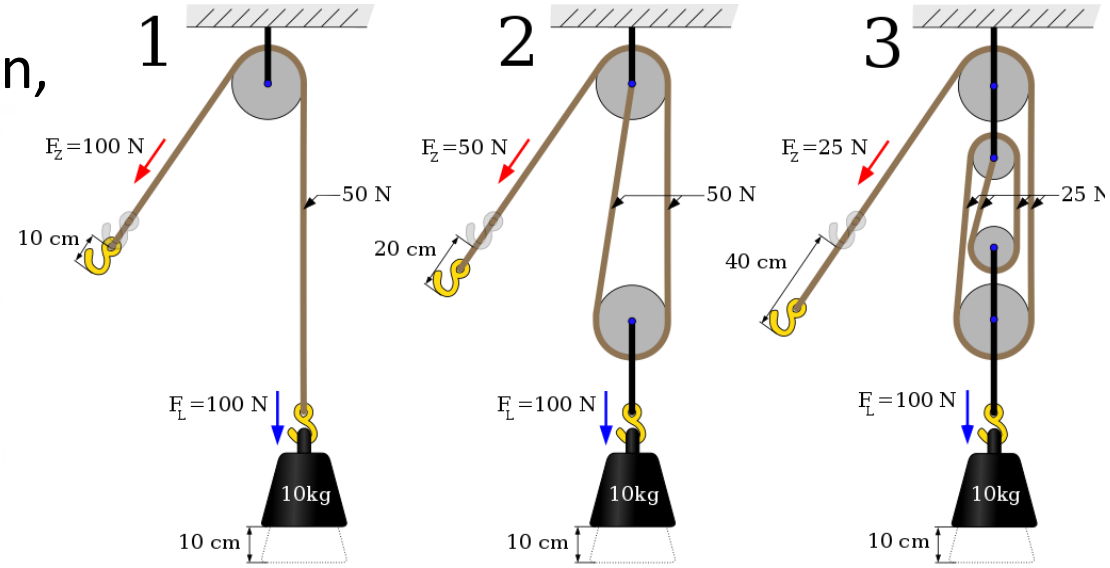
Few examples about simple physical systems

- **Motion transfert:**

In such a system it is possible to transfer impulsion (moment), power or energy from a part to another one. it includes simple collisions (elastic/inelastic) between, poulley combination, and gear wheel

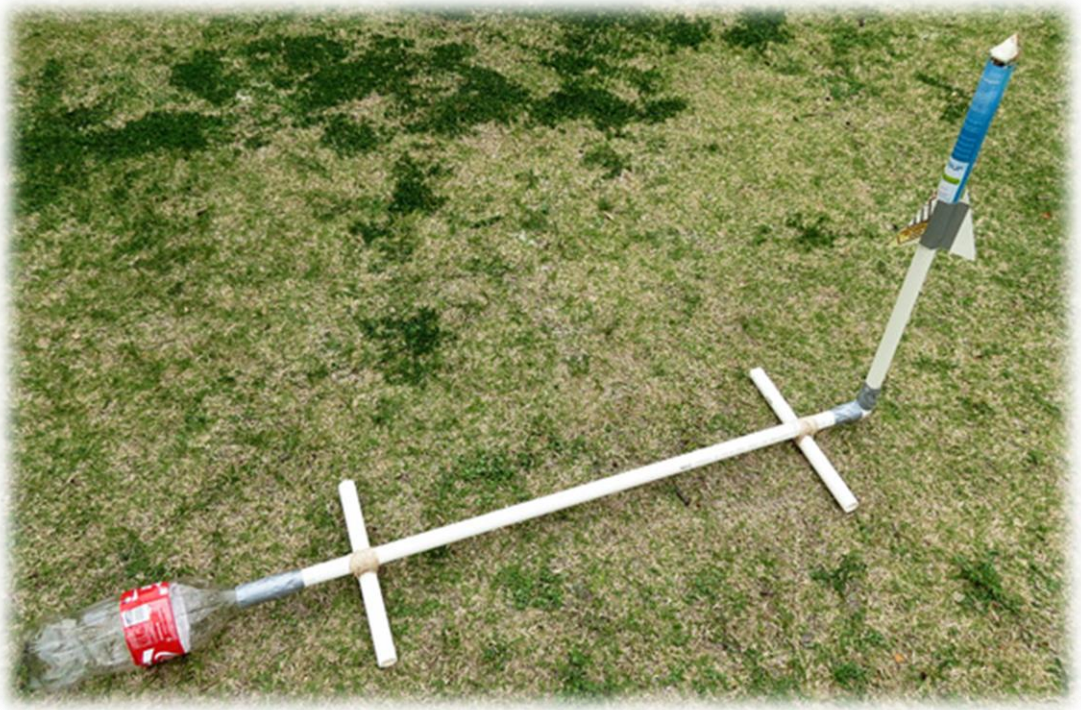






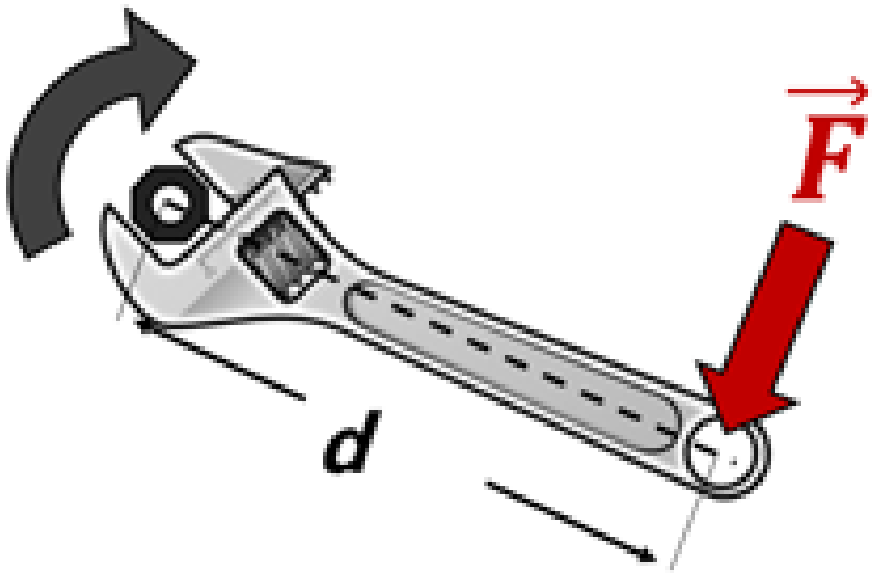
Few examples about simple physical systems

- **Catapult, Launcher and Rockets:**



Few examples about simple physical systems

- **Moment of forces (Torque):**



Few examples about simple physical systems

- **Van Der GRAFF Generateur :**

Few examples about simple physical systems

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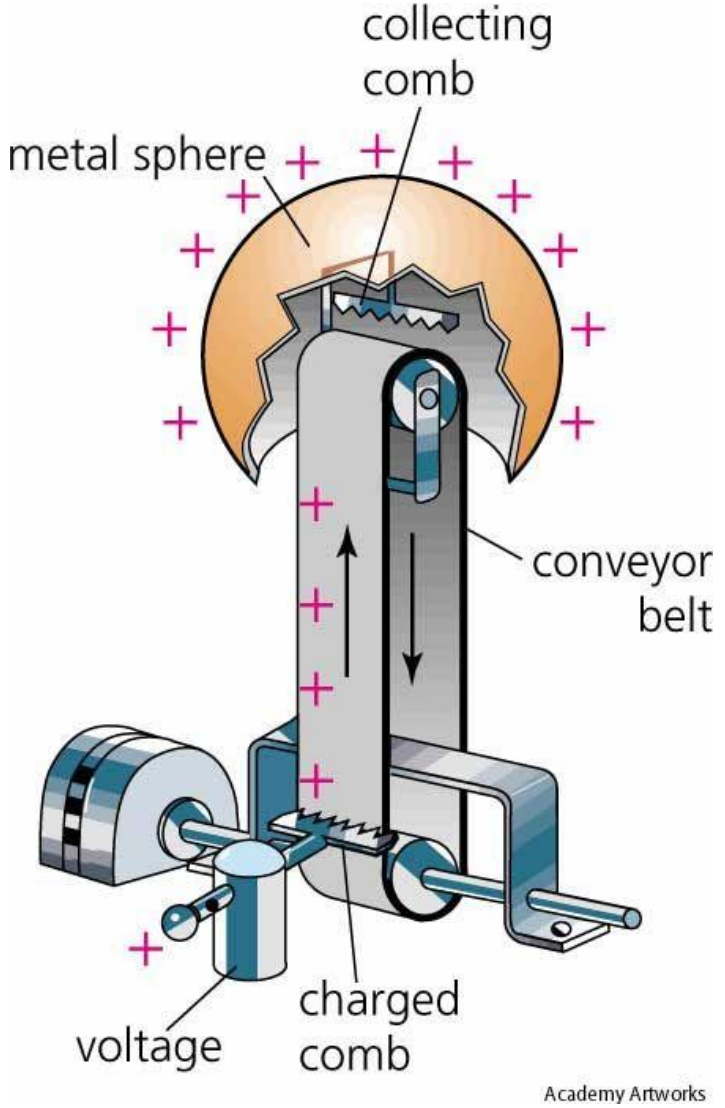
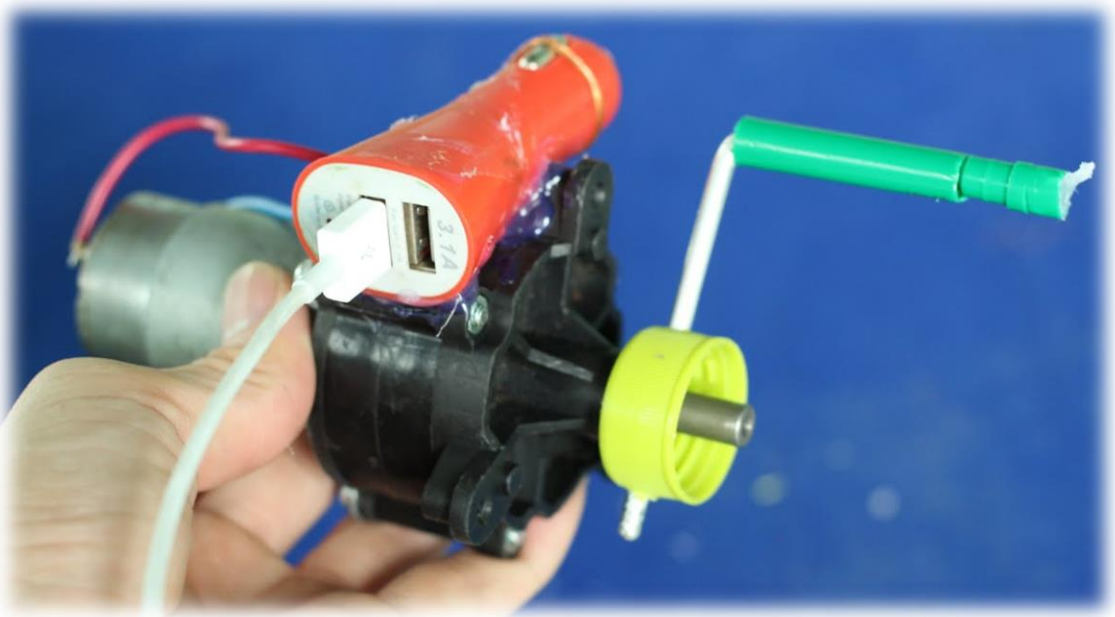


Few examples about simple physical systems

- **Manual Dynamo 12V:**



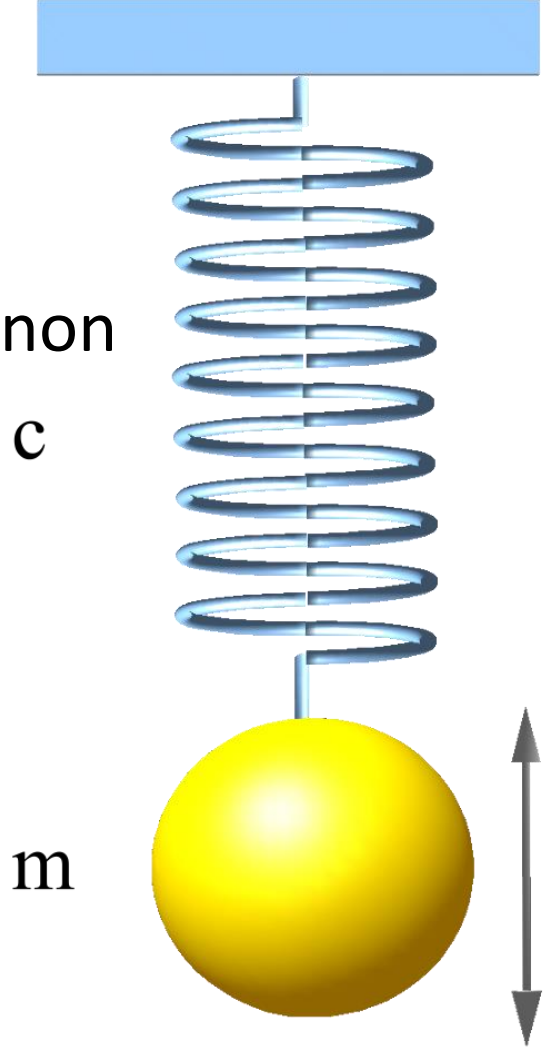
Few examples about simple physical systems

- **Bicycle generator:**

How we will do it?

How we will do it?

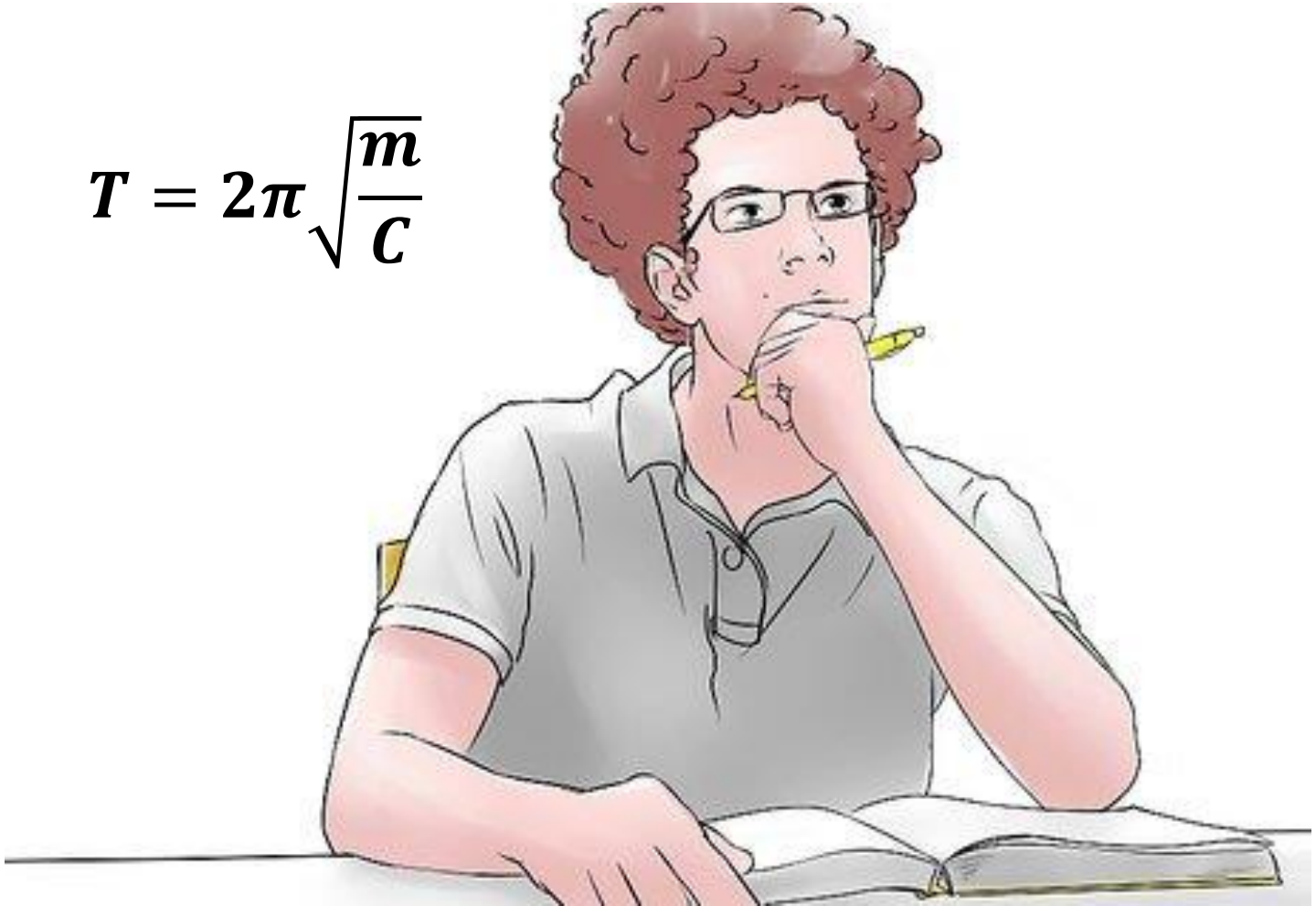
- For a given system, you need to understand the phenomenon

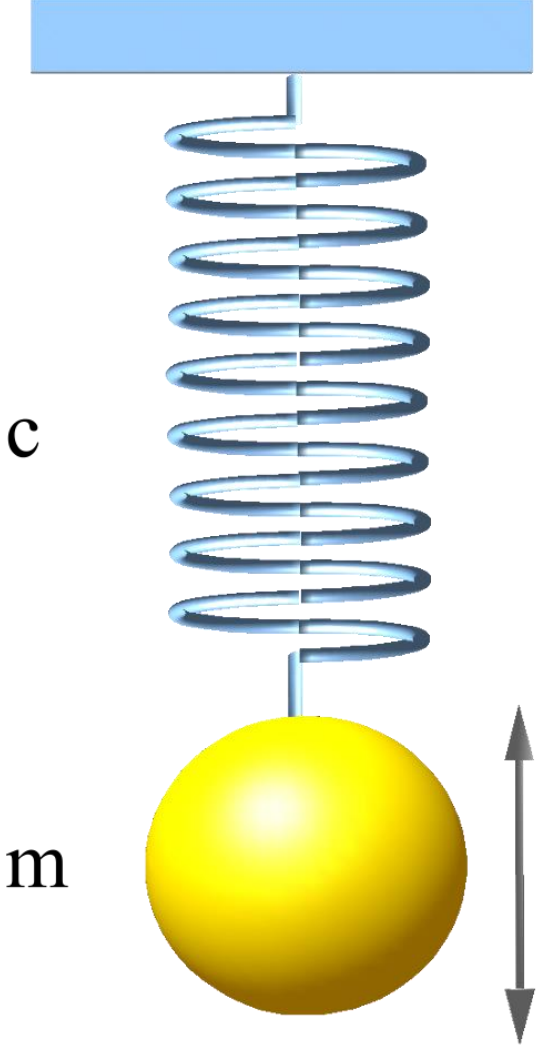


How we will do it?

- Deduce or verify the physic law of this phenomenon

$$T = 2\pi\sqrt{\frac{m}{C}}$$





How we will do it?

- Try to realize the experiment and perform measurments

$$T = 2\pi\sqrt{\frac{m}{C}}$$

- This could be done by varying the relevant parameters of the physical law and see how they are correlated.

How we will do it?

- Remake the experiments (a group of 2-3 students) during the session (continuous evaluation)
- Realize your own project during the semester (a group of 5 students at most)
  - You need to form a group (no more than 5 students by project)
  - Think about a feasible project, then discuss it with your teacher
  - Final proposition should be realized within 6-8 weeks (at least 1/2 day by week for you project)
  - Present your project in front of a jury

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phyphox

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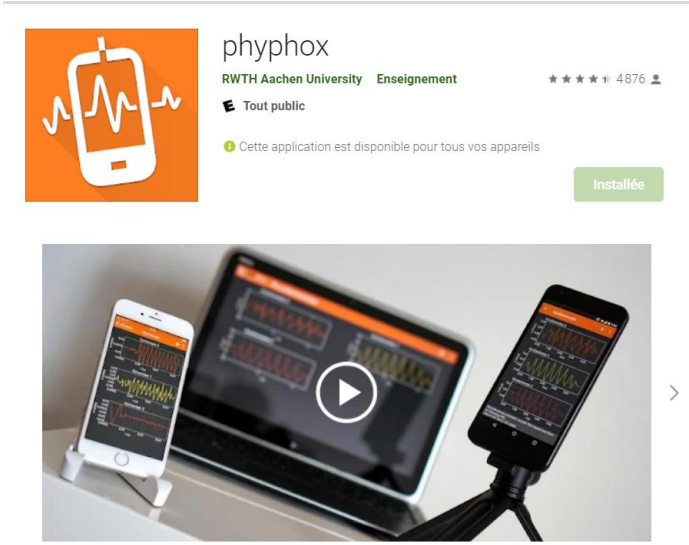
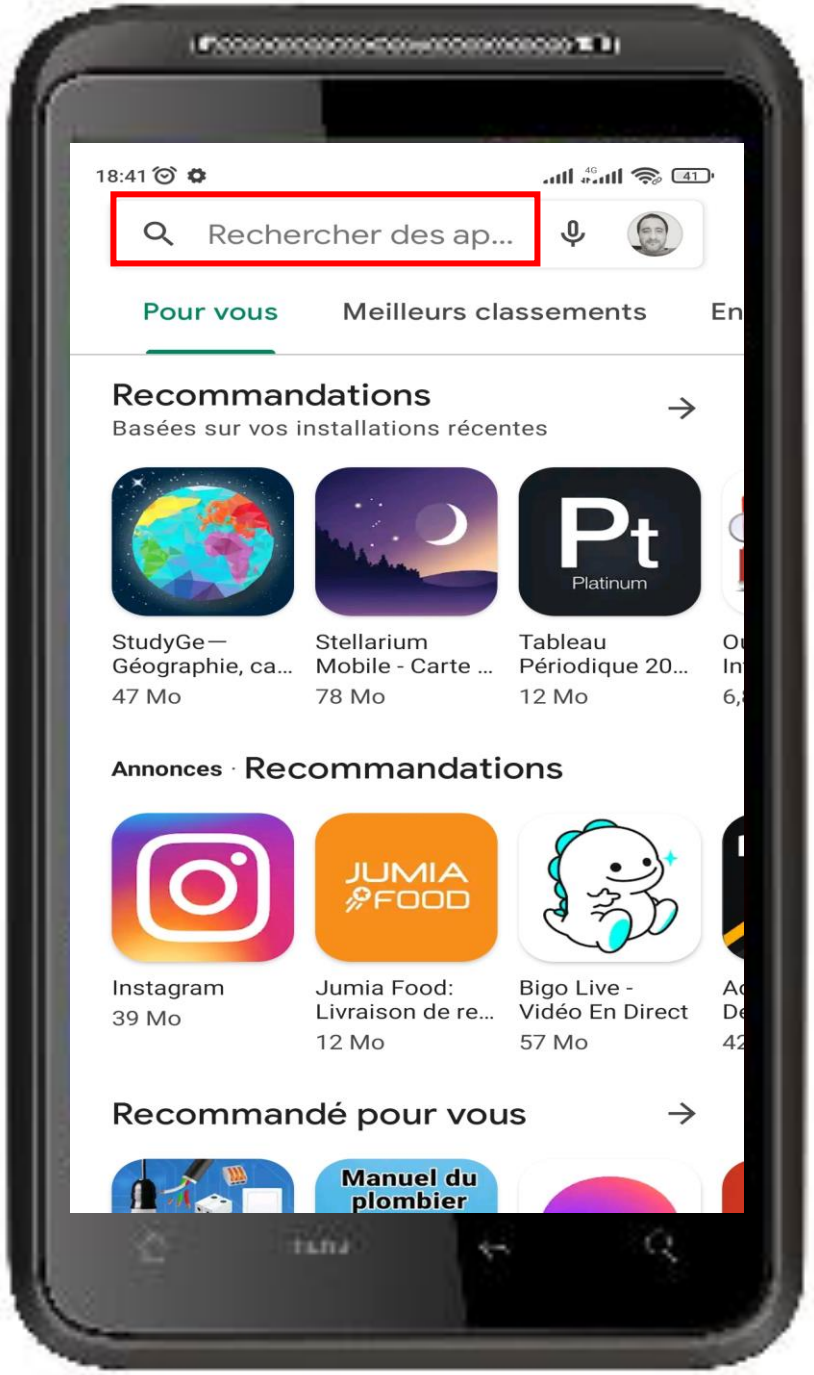
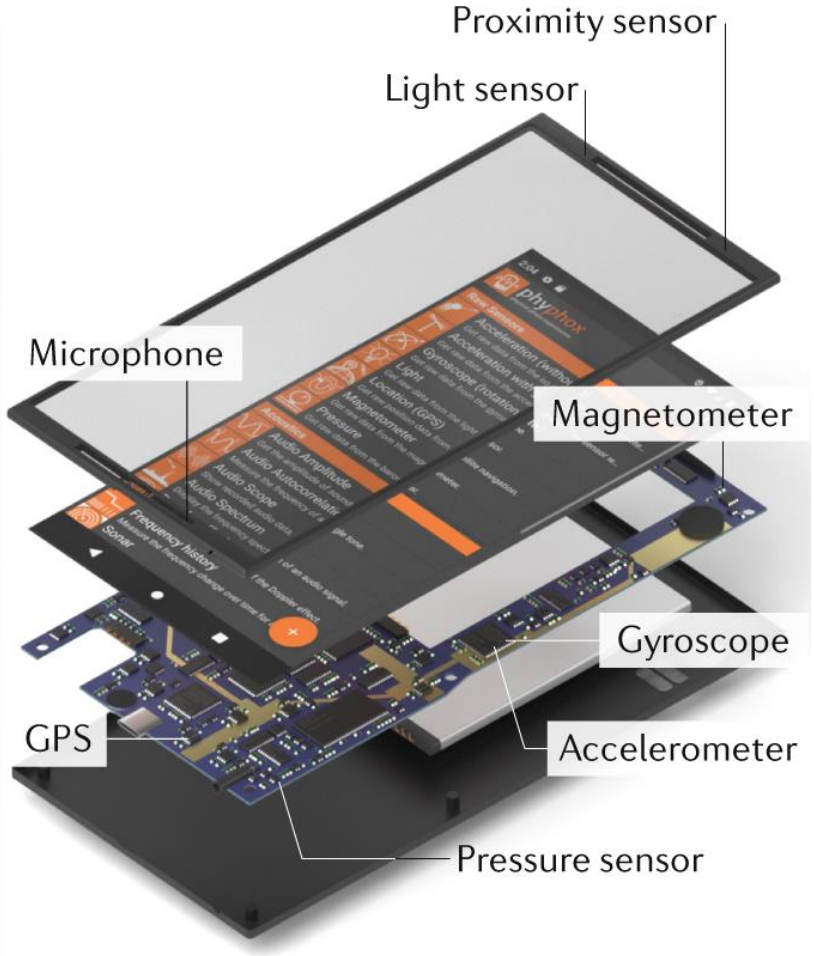
ANDROID APP ON Google play





Turn your phone into a multimeter instrument



Why it is important ?

Learning Pyramid

Keep in touch

You can contact me by email:

s.bentridi@univ-dbkm.dz (Questions, Conseils, Orientation…)