Lesson3: Making of physics knowledge

- One way of understanding the concept of knowledge is to look at the different ways in which we acquire knowledge.
- There are two types of knowledge from two entirely different sources.
- knowledge through experience:- seeing something, hearingaboutsomething,feelingsomethingcalled*aposteriori*knowledge.
- knowledge that does not come from experience, but perhaps instead is intuitively supplied from reason itself, such as logical and mathematical truths called a priori knowledge.

Experimental knowledge

Experiential (*a posteriori*) knowledge is of many types.

Four of them are sensory perception, introspection, memory, and testimony: these are the four main ways of acquiring knowledge through experience.

I. **Sensory perception:** is perhaps the dominant source of experiential knowledge, it immediately raises a critical question. We gather knowledge by seeing, touching hearing, etc.
II. **Introspection:** is like a sixth sense that looks into the most intimate parts of our minds, which allows us to inspect how we are feeling and how our thoughts are operating. If I go to a doctor complaining of an aching back, she'll ask me to describe my pain. Through introspection I then mightreport,"Well,it'sasharppainthatstartsrighthereandstopsrighthere." The doctor herself cannot directly experience what I do and must rely on my introspective description.
III. **Memory:** is like a recording device that captures events that one can experience more or less in the order that they occur.
IV. **Testimony:** Testimonies from written sources are usually more reliable than oral sources, but much depends on the integrity of the author, publisher, and the methods of fact-gathering.

Non-Experiential Knowledge

Non-experiential (*a priori*) knowledge, this source of information is more difficult to describe. We presumably gain access to this knowledge through rational insight. Usual examples of non-experiential knowledge are mathematics and logic. Take, for example, 2+2=4. Indeed, I might learn from experience that two apples plus two more apples will give me four apples.

Scientific method

The **scientific method** is an ordered series of steps to acquire knowledge based on experimental evidence

Examples of Scientific Method in Physics

Observation: the water boiled at a lower temperature when I was visiting the mountains than when I was in other cities with low altitudes.

Question: Why does my water boil at different temperatures?

Research: In a chemistry book, you read that the boiling temperature of a substance depends on the strength of the molecular bonds of a substance and the pressure.

Hypothesis: Since the atmospheric pressure changes with altitude, the boiling temperature of water is different at different altitudes.

Experiment: You decide to heat water at different altitudes and record the boiling temperature.

Analysis: Your measurements indicate that as the height increases, the boiling temperature of water decreases

Conclusion: The original hypothesis was correct. The boiling temperature of water decreases approximately by one degree Celsius