

# Physics -- What is it about?

## Introduction

What is the content of the science which goes under the title "Physics." Put succinctly, Physics encompasses two fields of intellectual endeavor.

In the first, the purpose is to provide the simplest, most economical and most elegant description of "nature as we know it." The last part of the previous sentence of necessity implies that physics is an experimental science. No matter how persuasive a body of thought, if it is not supported by any observation it does not belong in the realm of physics. Of course, since new observational techniques based on what is already known are continuously under development, it may take decades before new results emerge. So one must maintain an open mind and be willing to accept that literally nothing is ever totally complete. A new finding may be just around the corner and if severally observed and confirmed, it will be enthusiastically incorporated.

The second field is in many ways more fundamental, deeper and also more challenging. In our discussions in Physics 121/122 we will encounter only one or two examples of it. In this case, the purpose is not to formulate a credible description of what is already known but rather to appeal to intuition and the flights of imagination which are a fundamental attribute of the human brain. As Einstein said, "unmitigated curiosity is the most powerful driver for the discovery of new knowledge."

Time and again, a physicist comes along to point out that something is missing from the existing relationships and in a bold and courageous step proposes an entirely new idea which challenges the experimentalist to devise methods to test the legitimacy of the proposal. If the idea is correct, eventually an observation will be made confirming the prediction. Its universal adoption will follow as more and more experimental results appear in accord with the initial claim.

Nature, of course, is our ultimate teacher. Once again, it pays to recall Einstein's statement, "The most incomprehensible thing about nature is that nature is comprehensible." Indeed, we have every reason to claim that nature may be complex and sometimes very puzzling but never capricious.

In PHYS121 we will deal with natural phenomena pertaining to motion of particles and rigid bodies supplemented by a brief discussion of Thermodynamics. Arguably, physics provides the bases for all scientific endeavors and is itself deeply imbedded in mathematics. Algebra and trigonometry will be used throughout.