

PHYSICS

Ever since the dawn of civilization, the evolution of the physical sciences has been driven by the simple need of humans to develop a better understanding of their world, in order to explain and sometimes predict the various macroscopic phenomena they experience in their everyday life. However, looking back in time it is often difficult to separate how hard scientific facts and abstract philosophical ideas have shaped our beliefs. Was it just new observational evidence that guided our progress or was it the application of radical new theoretical concepts to preexisting data?

The field of atomic and nuclear physics is probably one of the examples where we easily come face to face with this realization. The notion of "atom", that is the impossibility of dividing things ad infinitum, was proposed by the ancient Greek philosophers Leucippus and Democritus nearly 2500 years ago. Obviously no experiments could provide support for their idea at the time. However, over the past few centuries, we have been better able to comprehend the properties of matter, we identified the different elements, mapped their molecules and dissected their atomic structures. In their quest to look beyond the "atom" for the basic building blocks of matter, physicists proposed new theories, devised new experiments and discovered that atoms consist of electrons as well as the atomic nucleus and its associated elementary particles, the proton and the neutron. Even this knowledge though was not enough to create a consistent and unified picture of our world. During the last decades further work led to the discovery of quarks and the development of the string theory, but still the "atom", this last indivisible object, has yet to be conclusively identified.

In the present second volume of the MCFA *Annals*, the Physics section includes two interesting articles that follow along those steps in our long journey towards the final theory addressing some problems of nuclear and atomic physics from both a theoretical and observational approach.

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