

## Recapturing the Legacy of Our Ancestors ... Inventing our Future

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Science is the passion to explore all that exists around us and utilize it to improve the quality of our life. This passion guided the first man to discover fire and to learn how to hunt and plant. In the 20<sup>th</sup> century, it led man to land on the moon, to understand the atom, and to unlock the human genetic code.

Nature manifests itself to us on three scales: the human scale, the micro-world, and the macro-world. The phenomena we encounter on the human scale and those of the micro-world were successfully decoded into the laws of classical and quantum physics, respectively. This is evident in our ability to design and build instruments that work according to this understanding. The gas engine in our cars and the microchips and LCDs in our mobile phones and laptops testify to the human ingenuity in deciphering the language of the photons and atoms and harnessing their power. The macro-world, on the other hand, holds greater challenges and promises. For example, we cannot account for 96% of the mass and energy of the Universe and we call them dark matter and dark energy.

Science is clearly not a luxury for the developed nations. It is what makes developed nations. When we speak about science in the Middle East and much of the developing world, we often find ourselves speaking more about the legacy of our ancestors than the achievements of present generations and more about the challenges than the opportunities.

The quantum leap in affordable technology that we witnessed in the last phase of the 20<sup>th</sup> century introduced a paradigm shift that impacted every aspect of our life and opened up a host of new opportunities. Business now flows to where competence and cost are at best with less dependence on the geographic location. For instance, most U.S. and European science journals are now being edited and prepared for publication in one country: India. Doctors in one country can read digitized X-ray, MRI and other medical records; make diagnosis; and even supervise an operation taking place in another country or continent. In short, the resources and tools of empowerment are becoming increasingly available to all. This is changing the landscape of scientific research as well.

In many areas of science, the data from an experiment conducted in one country can become immediately available to scientists worldwide. This is best highlighted in astrophysics and space science where the observations and data from the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) space missions, in addition to the software tools required to analyze them, are freely available from online archives to scientists around the globe. Yet, they are largely underutilized by the developing world. In 2008 less than 5% of all publications utilizing the data of NASA's highly successful gamma-ray mission, *Swift*, are led by authors from developing countries.

The International Year of Astronomy is a commemoration of astronomy and its contributions to society and culture, symbolized by the first use of the telescope by one man (Galileo Galilei) in 1609. Four hundred years later, the new tools to explore the universe are remarkably available to all. This will surely expand the horizons of discovery and innovation and make it possible for people from all nations and cultures to participate in cutting-edge research and reclaim their common heritage in science. This is a true reflection of the international character of science. However, it will not happen spontaneously.

The International Year of Astronomy is an important opportunity not only to celebrate and rediscover our connections with the Universe and engage the public in such an incredible journey, but also to enable and empower more people to participate and contribute to astronomical discovery, especially in under-represented regions. The fact that developing countries can immediately begin to utilize the 21<sup>st</sup> century tools of exploring the Universe, with little or no need for new infrastructure or equipments, leaves no room for common excuses and makes such an endeavor highly rewarding and fulfilling for astronomers, physicists, and mathematicians aspiring to work on forefront research.

Astronomy and space science do not only yield better understanding of the universe and beautiful pictures of the cosmos. They have real impact to our daily life and are linked to services that we take for granted every day. All satellite-based applications, such as GPS navigation, weather prediction, remote sensing, mobile communications, and TV broadcasting, would have not been possible without the basic understanding of gravity and planetary orbits that are required to put a satellite into orbit. These were once considered to have limited or no practical implications. Likewise, many advanced technologies that were originally developed for space exploration continue to turn into products and services that improve the lives of ordinary people on Earth, e.g. water filtration systems, the ventricular-assist heart pump, and laser corrective eye surgery, to name a few.

Mounting evidence indicate that economic development is coupled to scientific competitiveness. A positive correlation between national GDP and the number of publications in basic science, including astrophysics and space science, attests to this fact, among others. Because the advanced tools used nowadays in data analysis in astronomy and physics are becoming increasingly important in other areas such as engineering, finance, and business, broad spin-off benefits are real.

Among all disciplines of science and basic knowledge, astronomy stands out with its special appeal to all cultures. In virtually every corner of the world, one may start a conversation about astronomy and will often hear a version of "our ancestors excelled in this field". This common heritage should be seized and utilized in 2009 to motivate the new generations in less developed regions to recapture the legacy of their ancestors. This cannot be more relevant to us in the Middle East. Concerted efforts are key to materializing this goal. This booklet of essays, the conference, and the public outreach program are part of our share in this endeavor. I trust that the readers, whether they are students, scientists, educational or research institution leaders, national policy makers, or writers and media producers, will do theirs.