Launch Pads for the New Millennium

The Third Millennium A.D. begins on January 1, 2001. Having described the progress of astronomy upto the present, the last year of the Second Millennium, let us speculate on what issues will provide the parsecstones for the future.

In the 28th Parsecstone, we promised a glimpse into the surveys of the Solar System provided by spacecrafts launched from the Earth. The 1960s decade saw the start of this adventure. With the exception of the Moon, where man landed for the first time on July 20,1969 through the historic Apollo 11 mission, manned landings are still well into the future.

Although the American and Russian space missions have sent several spacecrafts around the planets Mercury, Venus, Jupiter and Saturn also, Mars provides the greatest attraction. The issue of whether life exists on Mars , or existed in the past is still to be settled. The two Viking Spacecrafts landed on Mars in 1976 and carried out studies of the Martian soil for any sign of microbial life. The experiments were inconclusive. The interest was, however, revived in 1996, by the possible evidence of fossilized life found in a meteorite believed to be of Martian origin. Although the evidence is contested, it is agreed that Mars needs to be more carefully studied and NASA has begun a programme of periodic flights to the planet of which the Pathfinder mission launched in December 1996, was the first one. It is expected that humans may eventually land on Mars within two to three decades.

Another parsecstone will be reached when a space based gravitational wave antenna starts functioning and detecting gravitational radiation. A proposal (LISA: Laser Interferometric Space Antenna) is already on the drawing board and more will no doubt be proposed as the detector technology improves. In any case, the first positive detection of a gravitational wave signal will be a major achievement for technology.

Our understanding of the formation and evolution of galaxies is still in a rudimentary state, much like our understanding of stellar structure and evolution was at the beginning of the twentieth century. The parsecstone marking this understanding may well form the highlight of the twentyfirst century astrophysics.

As shown by the trend of the last two decades, technological advances will generate new tools for the astronomer, and many studies across all wavelengths of the electromagnetic radiation, hitherto considered impossible, may become reality. Contrary to the general expectation that deeper and more detailed studies will solve all questions is, however, unwarranted. Our present questions may be solved, but new ones may take their place.

What about cosmology? Despite the considerable optimism that exists in the big bang camp that the problem of the origin of the universe will be solved in the twentyfirst century (- some believe that this will happen in the first decade), my own personal expectation is that better and more sophisticated technology will reveal the as yet unknown details of the structure of the universe, with the result that cosmologists may have to rework their models. Inputs about the nature and extent of dark matter, redshift surveys, studies of anomalous redshift cases, gravitational lensing, extragalactic supernovae, gamma ray burst sources, etc., will provide challenges whose successful solutions will mark new parsecstones. But I doubt that we will ever understand the essential features of the universe in full totality.

Finally, will the twentyfirst century see the terrestrials discovering that they are not alone in the universe? If that happens, that will be the most important parsecstone in the history of mankind.