

# **FRONTIERS OF ASTRONOMY WITH THE WORLD'S LARGEST RADIO TELESCOPE**

**September 13, 2007  
Washington DC**

**When I saw the James Bond movie Goldeneye a few years ago I recall that near the end of the movie they show blowing up the Arecibo telescope super structure into a Big Bang of fire. I did not expect that and my emotions were disturbed and I started crying, fortunately it was only a movie.**

**When recently I heard the NSF Senior Review results suggesting a possible closure of the Arecibo telescope, somehow I was not similarly affected, because it was immediately clear to me that this cannot happen in a real world.**

**The telescope that produced a Nobel Prize in physics has the potential of more such successes.**

**We see a bright science future for the Arecibo telescope with its huge collecting area and superb instrumentation. No other telescope has ever operated both for passive radio astronomy research and for radar planetary sciences. In addition, the ionospheric research at Arecibo is the best in the world.**

**My first full time job in life started at Arecibo when the observatory was primarily an ionospheric research center. The main frequency was 430 MHz. It had a terrible long line feed to correct for spherical aberration, yet important science was done due to its huge sensitivity. In 1968 after pulsars were discovered, Arecibo made a quantum jump into prominence since it was well equipped to study such objects. In 1974 the surface of the telescope was**

changed to allow work at high frequencies including the 21 cm neutral hydrogen line. This opened up new important studies of distant galaxies and detailed studies of the Milky Way. In the 1990s the Gregorian Feed system was installed that increased the sensitivity of the telescope by more than an order of magnitude. Recently the superbly successful multibeam ALFA system has been surveying the depths of the universe and mapping its structure.

The technological initiatives and developments through the years at Arecibo have been impressive and more is expected. The scientific results have been equally impressive and the NSF should feel proud for supporting this Jewel of the Caribbean.

This unique radio/radar scientific facility promises a great future in scientific discovery, as we have heard in the last two days.

Now I am supposed to be the 'raconteur' for this meeting, and I went to the Webster dictionary to look up the meaning of 'raconteur', and it said 'one who excels in telling anecdotes'.

Well it was late in the 60s around midnight when I was observing Planetary Nebulae. It was raining cats and dogs and I had to go to the platform and change receivers. By the time I was back in the control room I was completely dripping wet and I had taken my cloths off. To my surprise Gordon Pettengill, then Associate Director, and Rolf Dyce were showing around some guests and Gordon was not amused. About the same time one night observing I had to go to the platform again and at those days in order to activate the cable car one had to hold a switch in the control room to enable the cable car to move, so traffic was monitored during observations. But I was alone and there was no one to hold the switch. So I put a small box under the switch that kept it at its unlocked position and quickly went to the platform. On the way down suddenly the cable car came to a halt at a high point. The box had slipped and the switch was deactivated. It was about midnight and there was no one

**around and I spent hours sitting on the floor of the cable car lamenting the lost observing time as my Planetary Nebulae passed over one by one.**

**In the last two days we heard important and unique science that can be done with the Arecibo telescope from dozens of energetic and creative researchers:**

**--Pulsars and fundamental physics including nuclear physics, the study of relativistic millisecond pulsars, and gravitational radiation. Was Einstein right?**

**--Transient radio sources and also SETI searches of which any success would be the greatest discovery made by human beings.**

**--Cosmology and galaxy evolution with large scale deep HI surveys and redshifted extragalactic molecular observations.**

**--The study of the Milky Way in its many phases including the enigmatic magnetic fields and complex molecules in star forming regions.**

**--The radar solar system program with the most powerful radar system in the world. The study of near earth objects and support for the NASA solar system projects. The Arecibo radar may even save the Earth from a collision with a comet or asteroid.**

**--Development of hi-tech wide band feeds and receivers and multibeam focal feed arrays, and Arecibo as an integral part of the Very Long Baseline Array.**

**--Most of all unknown discoveries are waiting to be made with the world's most sensitive radio telescope, limited only by our imagination.**

**I see a future exciting era of research and discovery in the Arecibo tradition. In addition, Arecibo will continue to be the best in science education to inspire thousands of students.**

**Yet, there is concern about the future of Arecibo, propagated mostly by ignorance of its scientific potential, but ignorance should not be an excuse !**

**Let the administrators get together and solve the funding issues as soon as possible, because science for the benefit of humanity cannot wait !**

**If I had to start my first job again. I'll choose to go to Arecibo.**

**Thank you.**

**Yervant Terzian  
Cornell University**