

# DR. SETI'S STARSHIP

Searching For The Ultimate DX

## Millimeter Magic

**W**here, exactly, within the vast electromagnetic spectrum are we most likely to detect radio evidence of our cosmic companions? The question is important to practitioners of SETI science, professional and amateur alike, because our terrestrial technology is limited. Wouldn't it be wonderful if we could view the whole spectrum, DC to daylight, in real time? We're talking about the ultimate panadapter. However, that's a little like trying to monitor every frequency on every ham band simultaneously in order not to miss the next opening to that elusive DX station.

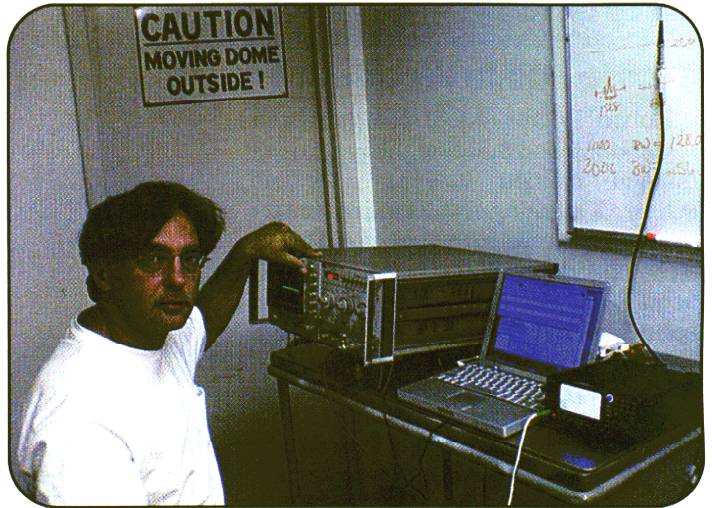
The DX that SETIzens seek, however, is even more elusive than the rarest uninhabited island which might some day be activated. At least, when a trek is mounted to a remote corner of planet Earth, we know the DXpedition's destination, what bands the team members plan to operate, what callsign they will use, their preferred modulation modes, and how long they plan to be there. With interstellar DX, we don't even know for sure that they *exist*, much less the particulars of their QTH, operating schedule, or band plan. Lacking any *a priori* knowledge, all we can do is guess, and the better we guess, the greater our chance of success.

The first scientific paper proposing modern SETI, co-authored by Prof. Phil Morrison, W8FIS, back in 1959, appeared in the prestigious British science journal *Nature*. In it, Morrison and his colleague Giuseppe Cocconi grappled with the concept of *magic frequencies*, those calling channels that Nature has carved into the cosmic bandplan, which would be obvious to any thinking creature on a planet orbiting any star. The assumption of mediocrity suggests that if we on Earth can figure out the bandplan, then our potential DX (being, we presume, more intelligent than we) will have figured it out as well. Morrison's and Cocconi's suggestion, the neutral hydrogen emission line at 1420.405751692 MHz, has been the starting point for nearly all the SETI searches that have followed. Hydrogen is, after all, the most abundant element in interstellar space, and it emits a clearly detectable, narrow-band calibration signal for all who care to tune its way. Surely if we can see that, so can *they*.

After nearly half a century of trying, though, we have yet to detect the interstellar CQ, on the hydrogen line or the myriad other magic frequencies we have monitored with Earth's best radio telescopes. Could it be we're listening on the wrong channel?

Peter Vekinis, LX1QF, thinks so. He speculates that advanced extraterrestrial civilizations will announce their presence in the millimeter-wave spectrum. Peter recently concluded two days of SETI observations from the 12-meter diameter radio telescope on Kitt Peak, Arizona. He selected ten frequencies between 115 and 177 GHz, associated with natural emission lines from molecules of biological significance on Earth. If organic processes are similar throughout the cosmos, Peter reasoned, then one or more of these frequencies might be obvious to the beings we seek to detect.

Peter's logic seems reasonable. If we are a typical example, then as civilizations advance technologically, they naturally gravitate toward ever higher frequencies. Yet the truth is that we're not all that advanced. It's easy for Earth's radio amateurs to monitor the



*SETI League member Peter Vekinis, LX1QF, on site at the 12-meter diameter millimeter-wave radio telescope on Kitt Peak, near Tucson, Arizona, in November 2006 scanning for intelligent extraterrestrial signals. Peter conducted a two-day observing run in the 170-GHz spectral region. His raw data, recorded as audio .WAV files, was made available for SETI League members to download and analyze. So far, no signal of obvious intelligent extraterrestrial origin has been found buried in the mm-wave noise.*

21-cm hydrogen line (after all, it's just up the road from the popular 23-cm ham band and our equipment tweaks up there quite readily). However, how many of us routinely tune the rarefied bands around 170,000 MHz? I venture to guess one could count them on the thumbs of one hand.

In just two nights of listening, Peter Vekinis recorded hundreds of gigabytes of noise. Somewhere, buried in that noise, he hoped to find ET, but sifting through so large a data set is a daunting task. To spread the workload among The SETI League's 1500 members, he put his data files on the web and encouraged his fellow members to apply their very best DSP techniques to the analysis. Several have risen to the challenge, although none has yet paid dirt.

Recognizing that downloading of GB-size files requires a broader bandwidth than the connection most of us enjoy, The SETI League decided to make the entire data set available on DVD. These disks are provided free of charge to SETI League members in good standing. If you want to lend a hand, first join our grass-roots, membership-supported, nonprofit ham club via <<http://www.setileague.org>>. Include with your membership application a note saying, "send LX1QF DVD," and we'll respond as quickly as an all-volunteer organization is able.

Vekinis is fortunate to have occasional access to one of the world's great millimeter-wave radio telescopes. Most of us are not so blessed. Therefore, until KenYaeCom starts advertising mm-wave rigs in the pages of *CQ VHF*, chances are we'll all be stuck in the low microwave realm, hoping some benevolent extraterrestrial DX club will choose to put up a beacon on the Novice bands.

Still, when that first 170-GHz rig hits the market, I plan to buy one and join Peter Vekinis in listening on one of his magic frequencies. I hope you will, too.

73, Paul, N6TX

\*Executive Director Emeritus, The SETI League, Inc.,  
<[www.setileague.org](http://www.setileague.org)>  
e-mail: <[n6tx@setileague.org](mailto:n6tx@setileague.org)>