

**GBT Science Working Group
Minutes, June 11, 1991**

Participating: Aller, Backer, Bania, Dickey, Giovanelli, Haynes, Kulkarni, Magnani, Altschuler, Wolszczan

1) Pulsar Signal Processor

Backer introduced a discussion of four pulsar observing strategies: (1) Searches, (2) Timing, (3) Data Processing, and (4) Individual Pulse Observations. The principal references were two memoranda written in March and circulated to SWG. These summarized existing systems and those under construction. The main requirements for Searches and perhaps for Individual Pulse Studies were approximately 500 channels in a filter bank or autocorrelation device, spread out over 100-200 MHz, sampled at a many-kHz rate. For Timing the main incremental requirement was for higher time resolution, for example, $\approx 10^3$ bins per period. The technical specifications were generally agreed to. The discussion shifted to how to proceed.

Because university groups had constructed excellent signal processors in the past and were still doing so today, and because both Arecibo and NRAO-GB staffs were stretched thin with their construction projects, reality dictated that a merging of efforts should be attempted. Backer suggested convening a session with representatives from major university and national center groups. The suggestion was endorsed by Kulkarni, Wolszczan, Bania, Aller, and perhaps others.

Kulkarni and Backer warned that a pulsar signal processor is expensive (amounts between 0.25 and 1 M\$ were mentioned, depending on what costs were included) and labor-intensive. These reasons, of course, explain why duplication of effort has to be minimized. Bania floated the idea that perhaps one device could be constructed, and it shipped back and forth between Arecibo and Green Bank. This appealed to no one else. Romney emphasized that collaborations had to be truly integrated efforts, as opposed to farmed-out but individual efforts.

Romney raised the issue of combining pulsar and spectroscopic processing needs into a single device. Lacasse reported that, for the Green Bank spectral processor, many of the boards were identical for pulsar or spectroscopic work. Kulkarni, on the other hand, stated that "to combine regular spectroscopy with pulsar processing is a great mistake you will never recover from." Wolszczan related that the Arecibo experience with trying to adapt a 40 MHz correlator to pulsar research demonstrated this point. Backer suggested that rfi excision was a need common to both devices. Certainly parts built for one need might be useful for another, but in general the split in goals for the two types of processor is there and should be treated as reality.

Wells asked what the anticipated rate was for recording a continuous stream of data and processing it at a supercomputer. The answer was Mbits/sec. Wells prophesied that by 1995 the ratio of supercompute time to observing time could possibly handle such a rate on line. Wolszczan agreed that commercial options might soon offer the ability to buy adequate processing hardware off the shelf.

2) Data Analysis

Seielstad asked for opinions on the wisdom of incorporating commercial software packages into a GBT data analysis system. Bania thought it only made sense if NRAO-GB had enough machines on site that users could log on remotely and use NRAO cpu. Otherwise, astronomy departments would be stuck with bills for software licenses that they could not afford. Giovanelli agreed that the software savings NRAO might accrue by buying rather than writing code would be dumped instead on users outside the Observatory, creating unwanted animosity. He also mentioned that a commercial package will not do the exact job needed; in addition, we will always want to modify and update our package. Magnani and others also recommended NRAO avoid the use of a commercial package. Aller thought there might be a combination of homegrown software that was distributable and commercial software running on Green Bank machines only.

3) Technical Review by Radiation Systems, Inc.

Hall reported on the 30% design review conducted June 5 and 6 at RSi. He was pleased by the progress Loral has made since the last design review. Hall is also pleased with the way RSi has staffed the program. We are close together on the foundation design, but have requested certain fairly minor changes. We have also insisted that drypack grout be used under the azimuth track. Loral is well along on drives; NRAO has some reservations about stiffness, but these are being addressed. We also agreed to reduce the number of elevation angles where we need a locking pin to three, since the brakes will hold the antenna in any position in winds up to 50 mph. The alidade geometry has been improved. NRAO has concluded that 1500 kVA should be adequate electric power. An emergency diesel generator's capacity will be increased from 300 to 600 kVA, however.

4) SWG Organization

There will be no teleconferences in July or August. The SWG members do not object to adding other people to the teleconferences. The project has evolved to the point where a more thorough agenda should be distributed in advance and where perhaps subcommittees focusing on particular aspects should be assembled.