

# ***NSF Major Research Instrumentation Proposal 2013***

**Status:** preproposal submitted to UW. CMU too? Decision expected next week. . Full proposal due at NSF Feb. 21.

**Strategy:** request to NSF can be up to \$4M but these are rarely funded. \$1M is more realistic. Can't be too similar to our ATI proposal (~ \$1M).

- Option 1: Build and test a CASPER correlator for Tianlai/BAORadio ( ~ 20 x 20 x 2 polarizations = 800 channels, 400 MHz BW)
- Option 2: Build and test feeds/LNAs for Tianlai/BAORadio (800 channels x \$1K ea)
- Other ideas?

# ***CASPER correlator budget***

- According to Dan Werthimer, for **800 inputs**, 400 MHz BW we need:
  - 50 roach2 boards, each with 2 quad ADC boards (1 Gsps) =  $50 \times \$6666 = \mathbf{\$333,333}$
  - 200 computers =  $200 \times \$6,900 = \$1,380,000$  (today's prices)
  - But scales by factor 1.5 per year: 2012.75 -->  $128 \times \$6,900 = \mathbf{\$883,200}$
  - 6 equipment racks now --> 4 racks in 2012.75
  - 1 ethernet switch ( 50, 40 Gbit ports or 150, 10 Gbit ports) = **\$90,000**
  - personnel: TBD

# ***Review of previous NSF MRI Proposal (January 2011)***

The proposed mapping of the 21 cm line on large scales provides a clever path to revealing the re-ionization history of the Universe and baryonic acoustic oscillations.

The cylinder radio telescope is a good idea that has already shown great promise, and the team has strong expertise with correlator design and deployment.

The correlator requirements are very similar to those of the Allen telescope array, which incorporates FPGAs, likely with lower capital costs, and smaller power consumption. Comparison between the proposed software correlator and FPGA-based devices is necessary.

By its nature, the cylinder telescope is susceptible to signal corruption through aliasing, which may limit the useful dynamic range. This issue was not addressed.

Many details of the correlator are left out of the discussion.

Power consumption of either a GPU-based or SW-based correlator of this magnitude will be substantial. This issue is not addressed.

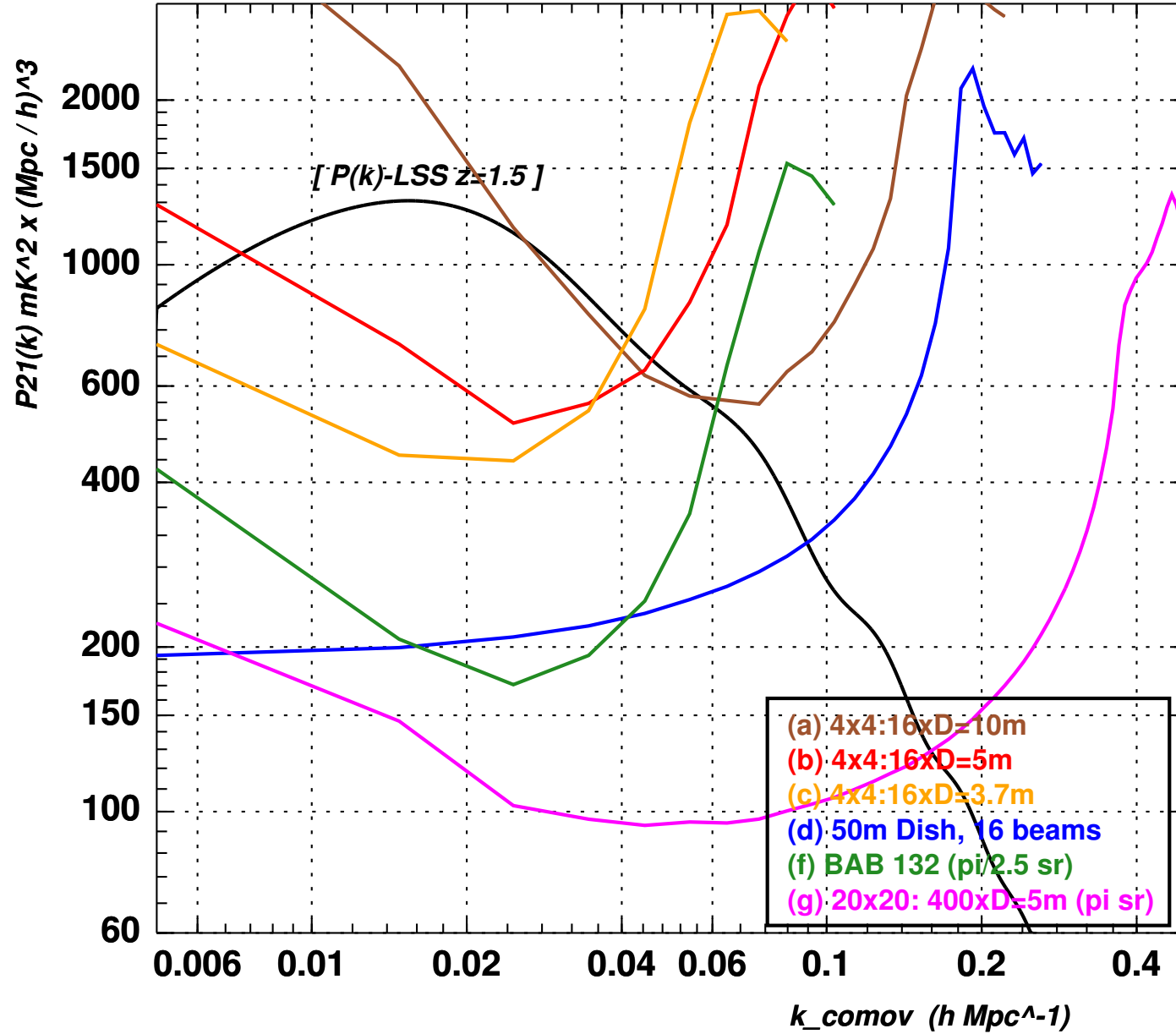
The collaborative ventures with the Buhl Planetarium, including the "Hydrogen Sky Show" are commendable.

The education and outreach programs of partner institutes are impressive.

The management plan is at points unrealistically optimistic.

The proposed science is excellent, and the GPU-based correlators present an intriguing path. However, important issues involving aliasing in the cylinder telescopes, and comparing the GPU-based correlators with FPGA based devices were not addressed.

**PNoise(k): z=1.5 - a,b,c,d: 1000, e,f: 4000 g:10 000 sq.deg survey**



PNoise(k): z=0.25 a,b,c,d:1000, e:2000 sq.deg survey

