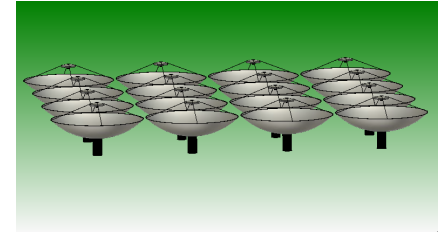


NSF Major Research Instrumentation Proposal 2014



Status: Preproposal (very general) is 1 of 3 just approved by UW. Full proposal due at NSF Jan. 23. Funds can start August 1, 2014. We choose duration (2 years?).

Scope: up to \$1M - \$4M for hardware, construction, testing, salaries.

- Not primarily for science observations.
- Funds can't be used to directly support foreign collaborators.
- *Need 30% 'matching' funds – invoices for purchases made by collaborators during construction period are OK. Need letters of commitment.*

Goal: Allow US to contribute to the BAORadio/Tianlai effort. Test advantages of compact, high-redundancy arrays with medium-gain (dish) antennas.

Motivation:

- Major challenges face all HI measurements: calibration vs frequency (mode-mixing); foreground removal; RFI, etc.
- Overcome drawbacks of first generation of dedicated HI interferometers

NSF Major Research Instrumentation Proposal

What should we do?

- 1) Supplement collaboration resources for **Stage I Engineering Array**: 4 x 4 dish array in Xinjiang?
 - provide larger dishes than currently planned (10 m instead of 5 m?)
 - provide ‘outrigger’ dishes on long baselines for pt source removal?
 - support a project manager? (UW did this for Daya Bay.)
 - what is missing?

- 2) Expand Stage I 4 x 4 dish array toward **Stage II First Science Array** (16 x 16) in Xinjiang?

- 3) Other ideas?

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Hardware plan – need schematics/photos

- 1) dishes
 - 5 m? 10 m? on-axis
 - cheap satellite dishes? Institute 54? PAON design?
- 2) LNAs/receivers – Institute 54 design?
- 3) Signal transport – RF over fiber?
- 4) ADC/FPGA boards
 - Institute 54 design?
 - Bandwidth 100 MHz?
- 5) Correlator
 - Institute of Automation design?
 - GPU accelerated?
- 6) Site – Xinjiang
 - RFI plot comparing to SKA sites
 - Sketch of proposed buildings & infrastructure

NSF Major Research Instrumentation Proposal **Science Case - Help!**

- 1) Update Dark Energy science for full array (20 x 20?)
- 2) Neutrino mass?
- 3) Radio transients (Thornton et al) – need de-dispersing electronics.
- 4) Find/monitor HI absorbers (what spectral resolution does the current ADC/correlator system have?)

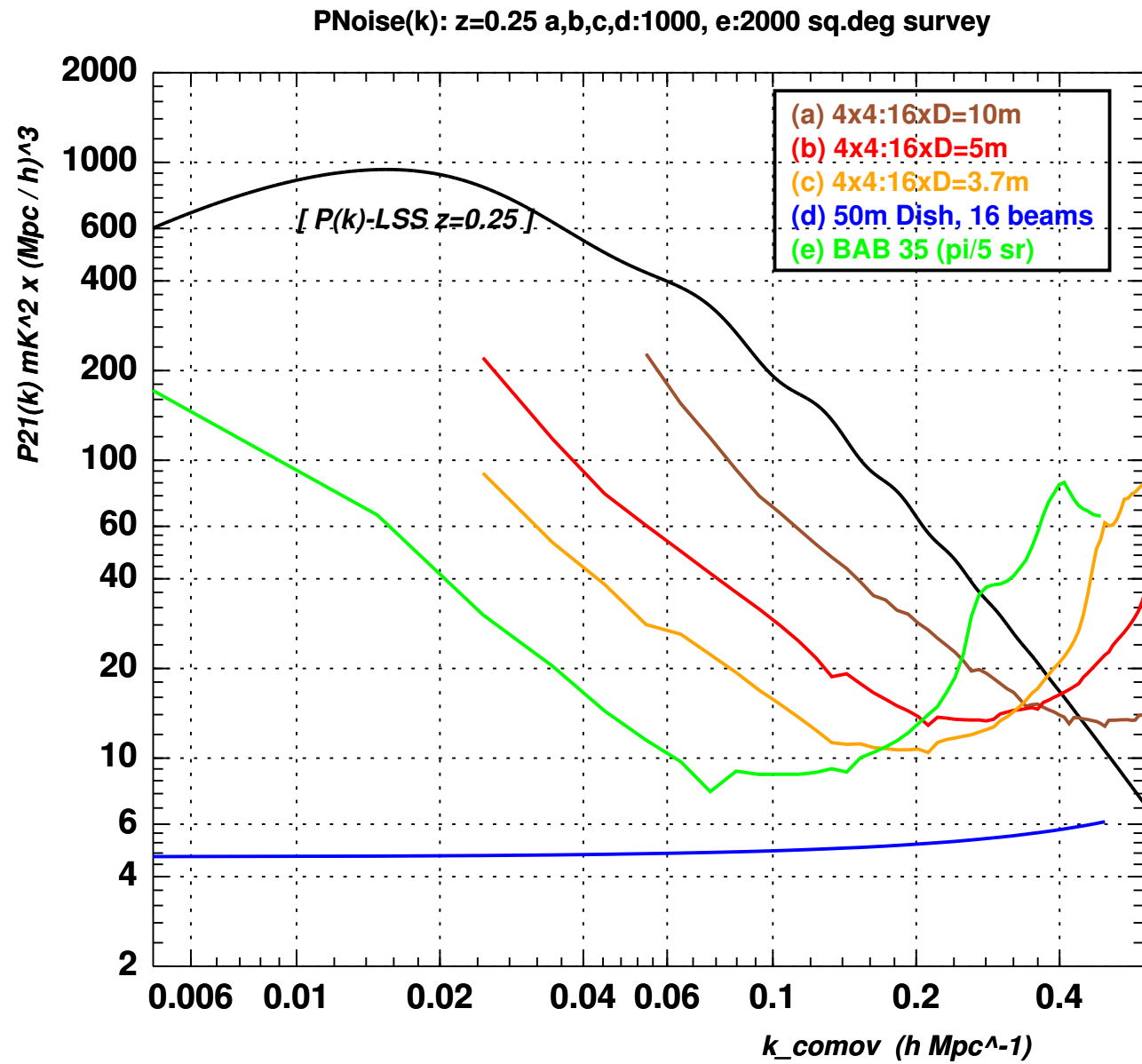
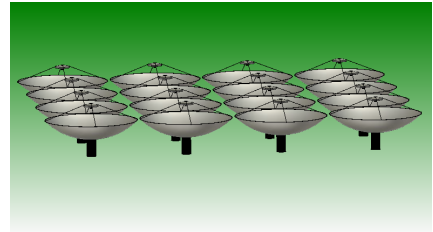
Reviews of previous NSF ATI Proposal (Nov 2012)

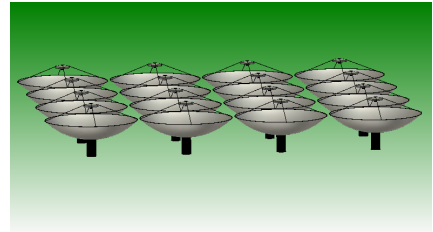
Generally positive (Excellent, Very Good, Very Good)

Need to work on:

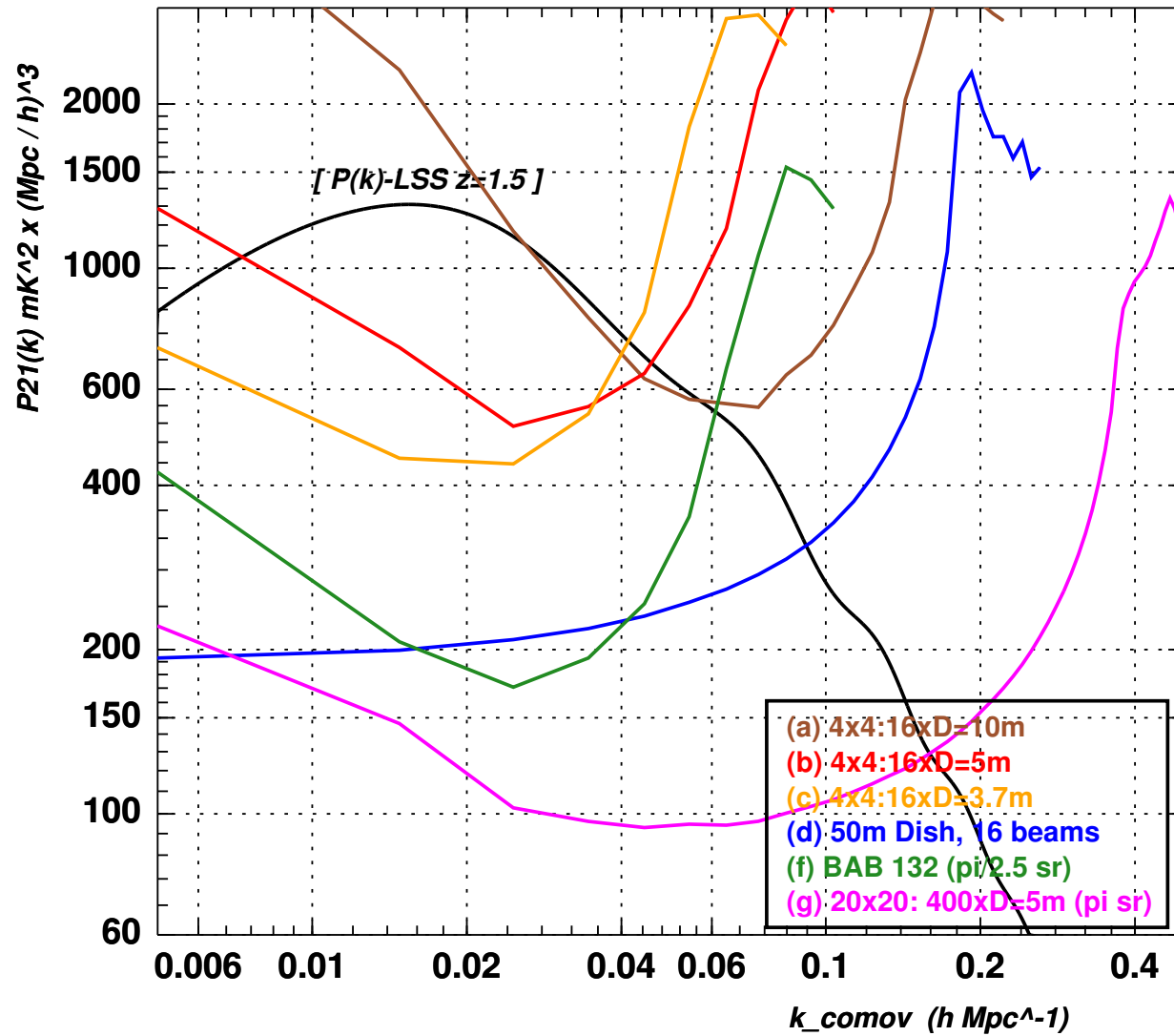
“Management plan; it is not made clear who will do the work. There are collaborators mentioned in the proposal whose roles are unclear and from whom there are no statements of participation. The exact status of the funding from partners in China is not established in the proposal. Some of the technology has not yet been demonstrated.”

“Scientific motivation, the proposal does not provide in much detail any comparisons of the value of this particular measurement, as well as those from the subsequent HSA, with other techniques for constraining structure-formation theories.”





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



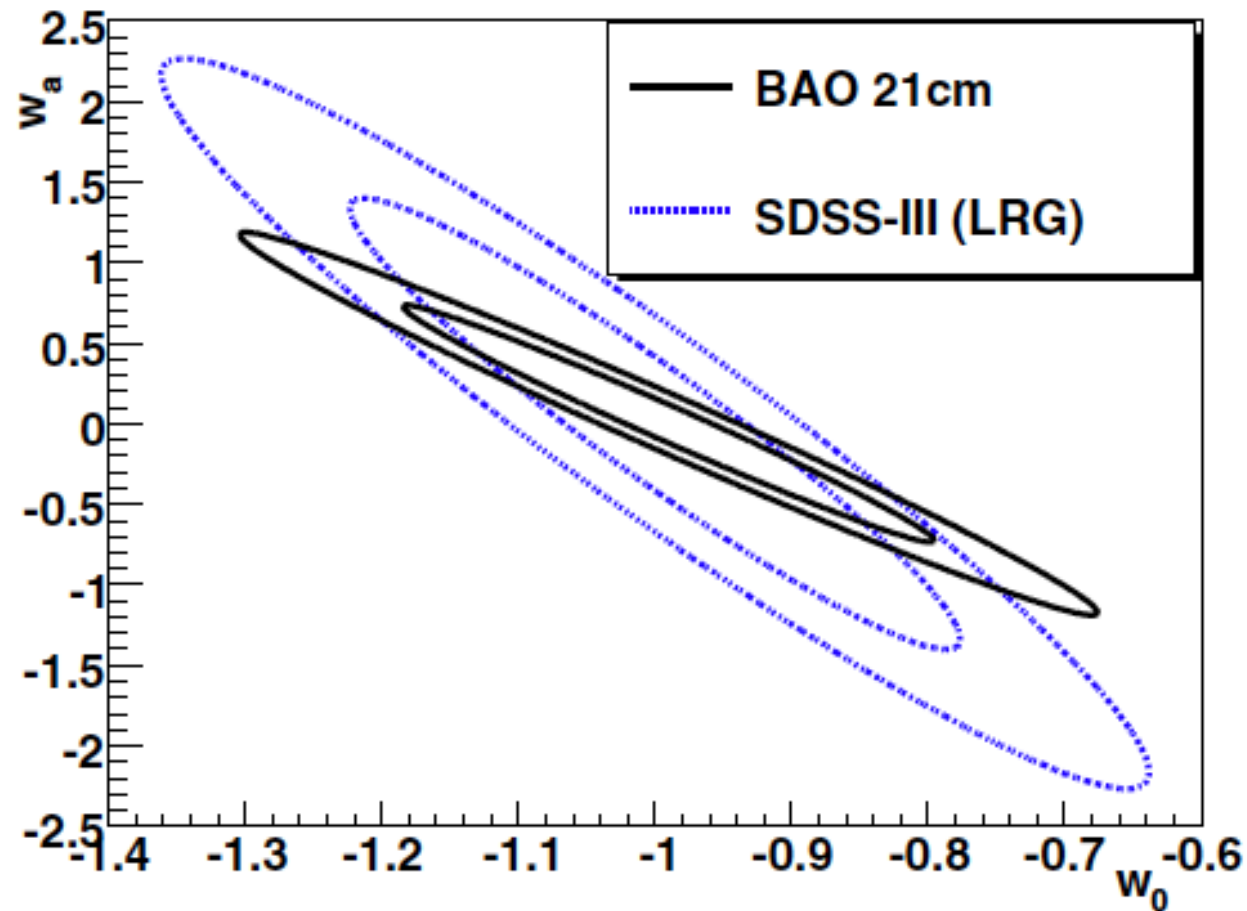
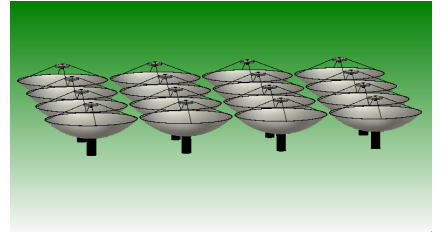


Fig. 18. 1σ and 2σ confidence level contours in the parameter plane (w_0, w_a) , marginalized over all the other parameters, for two BAO projects: SDSS-III (LRG) project (blue dotted line), 21 cm project with HI intensity mapping (black solid line).

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Design:

simulated foregrounds/mode mixing – Le
antenna pattern sims – TaoLiu/Chris Anderson

Broader Impacts:

EoR/HERA pathfinder
data release plan?
outreach – planetarium show via CMU/ETC?

Data Management Plan:

data storage, transfer, sharing

Draft ready for inspection: Weds Jan 15