Title: Array Site Reports cont.

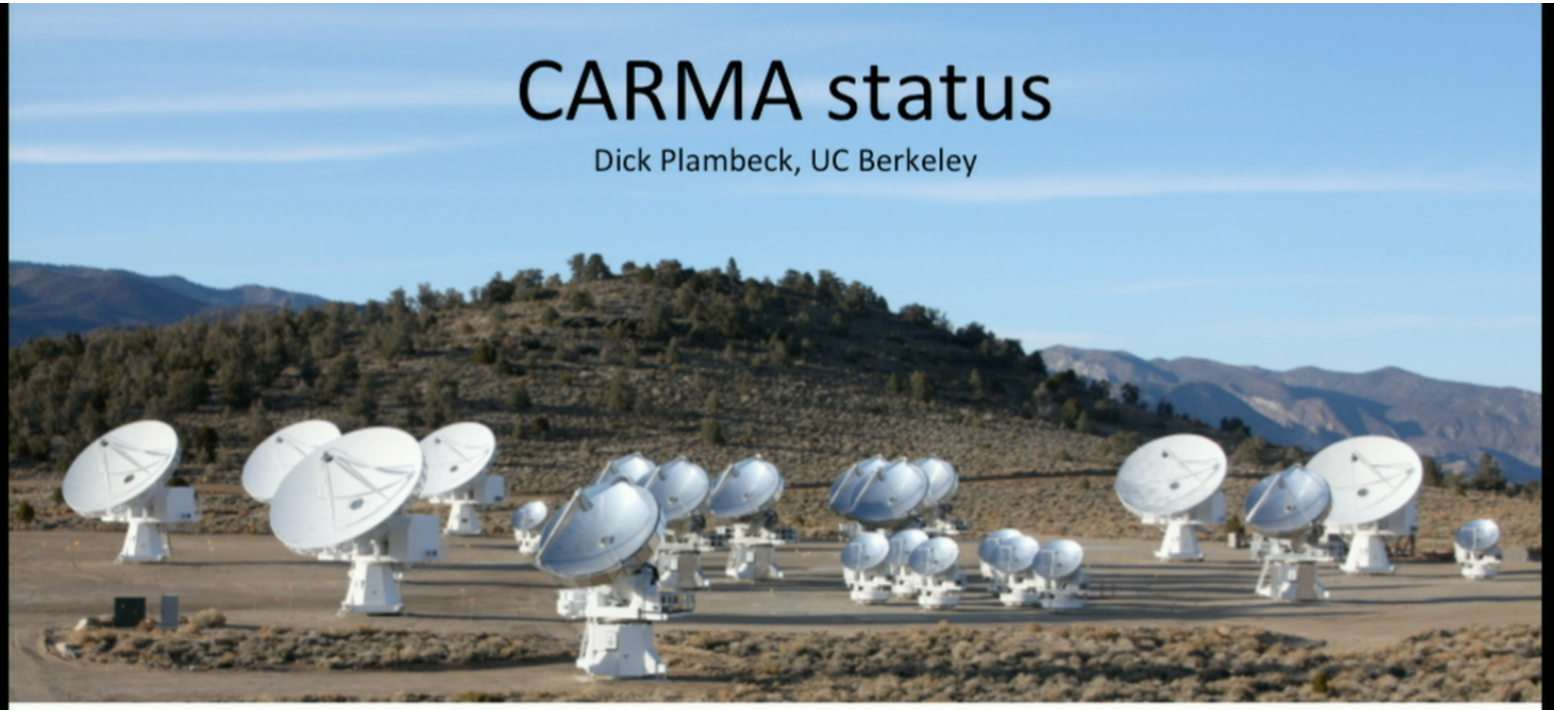
Date: Nov 13, 2014 10:20 AM

URL: http://pirsa.org/14110100

Abstract:

CARMA status

Dick Plambeck, UC Berkeley

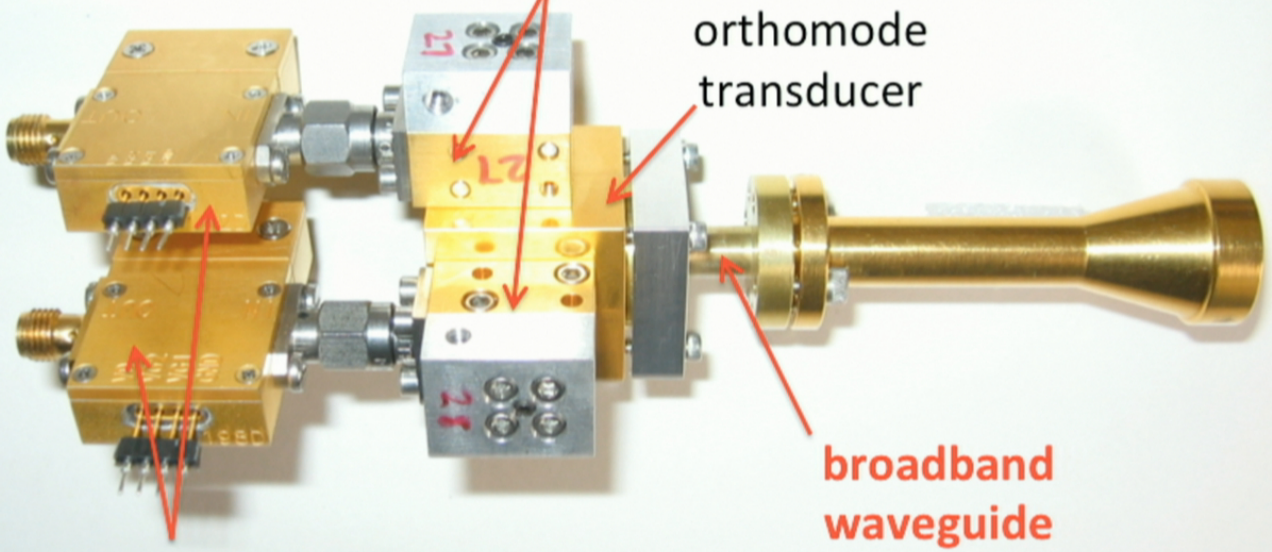


- 2 VLBI stations!
  - beamformer phases 8 telescopes (equivalent of a 25-m single dish)
  - one 10-m telescope is operated as a separate station for calibration purposes


MacMahon, Matt Dexter, Alan Rogers, Jason
SooHoo, Christiaan Brinkerink, Laurent Loinard, Joe Lazio, Gisela Ortiz, …
11/13/14
Plambeck - CARMA status
2

1mm dual polarization receivers

SIS mixers – ALMA Band 6 devices in DSB mixer block

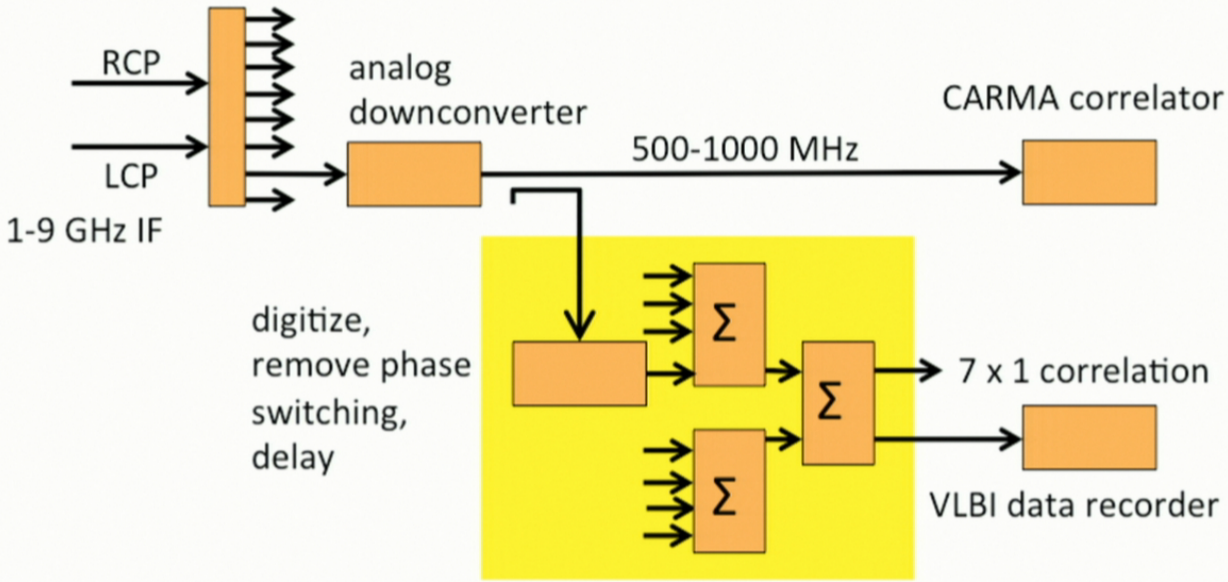


orthomode transducer

broadband waveguide circular polarizer (no waveplates)

WBA13 I.F. amplifiers (1-9 GHz)

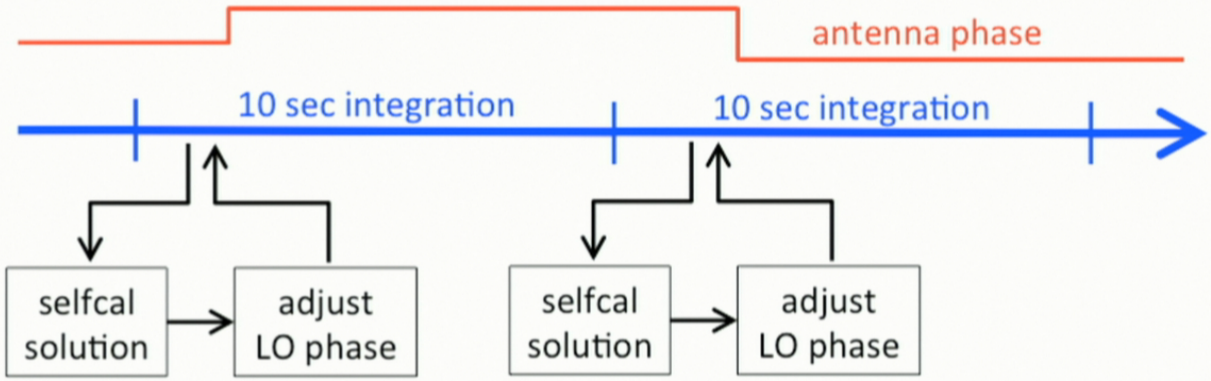
beamformer (SMA - Berkeley development) operates in parallel with CARMA correlator



- each beamformer phases 8 telescopes, 500 MHz bw

antenna phasing

- phase up beamformers on a strong calibrator at beginning of each night, using 7 baseline × 500 MHz correlator
- thereafter, use 105 baseline × 4 GHz CARMA correlator to maintain phase relationship of antennas



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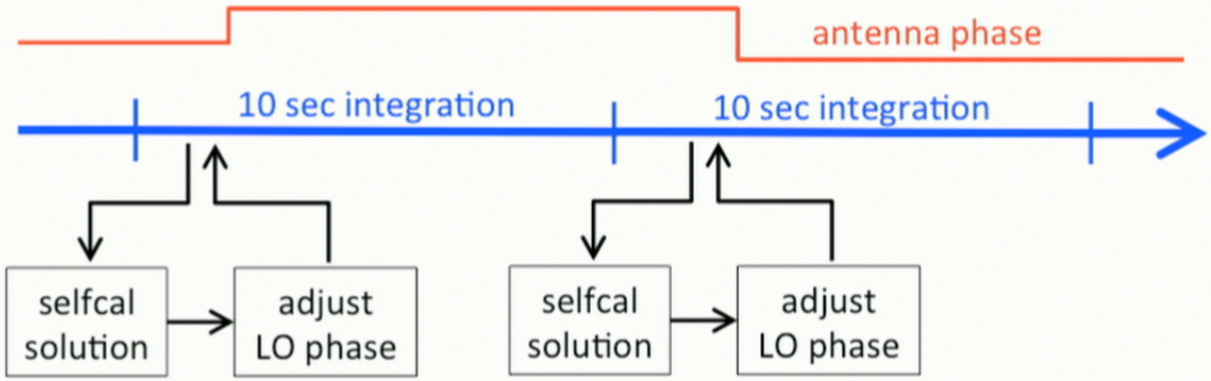
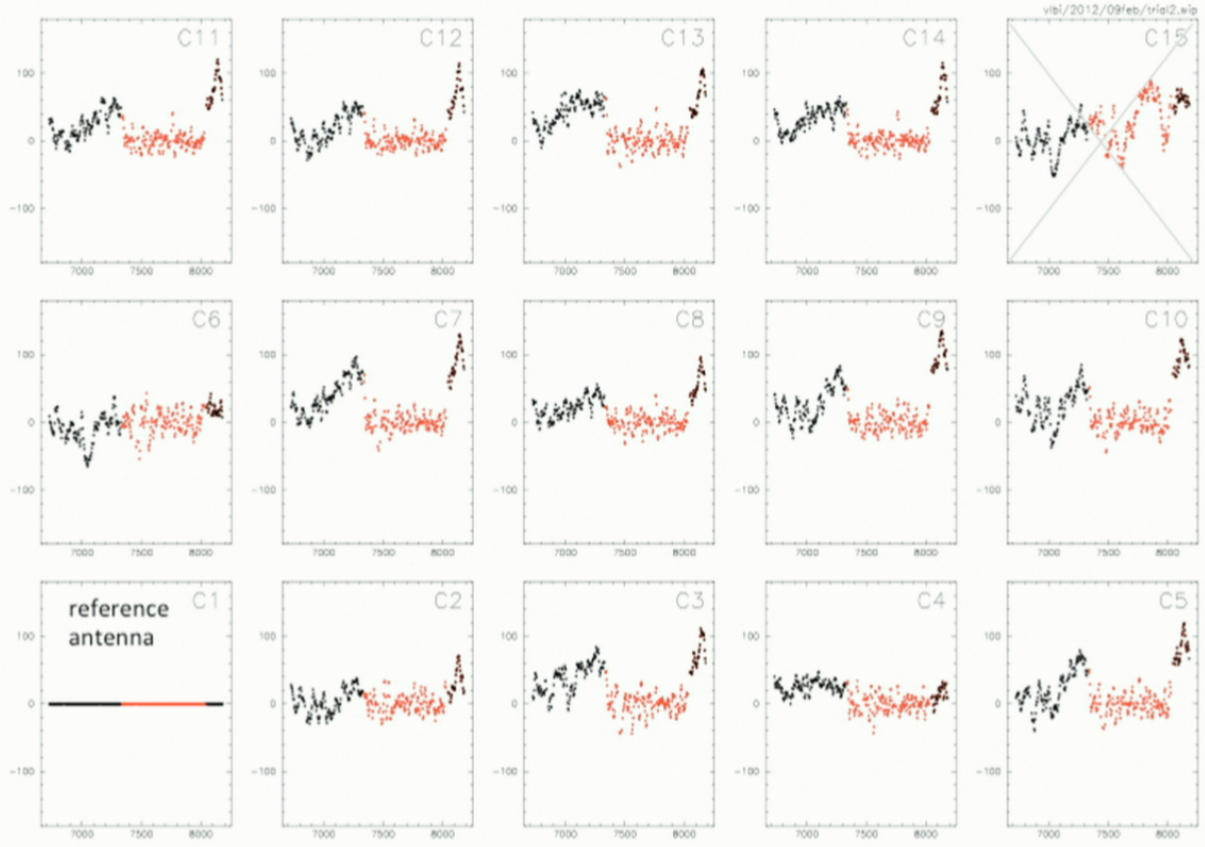
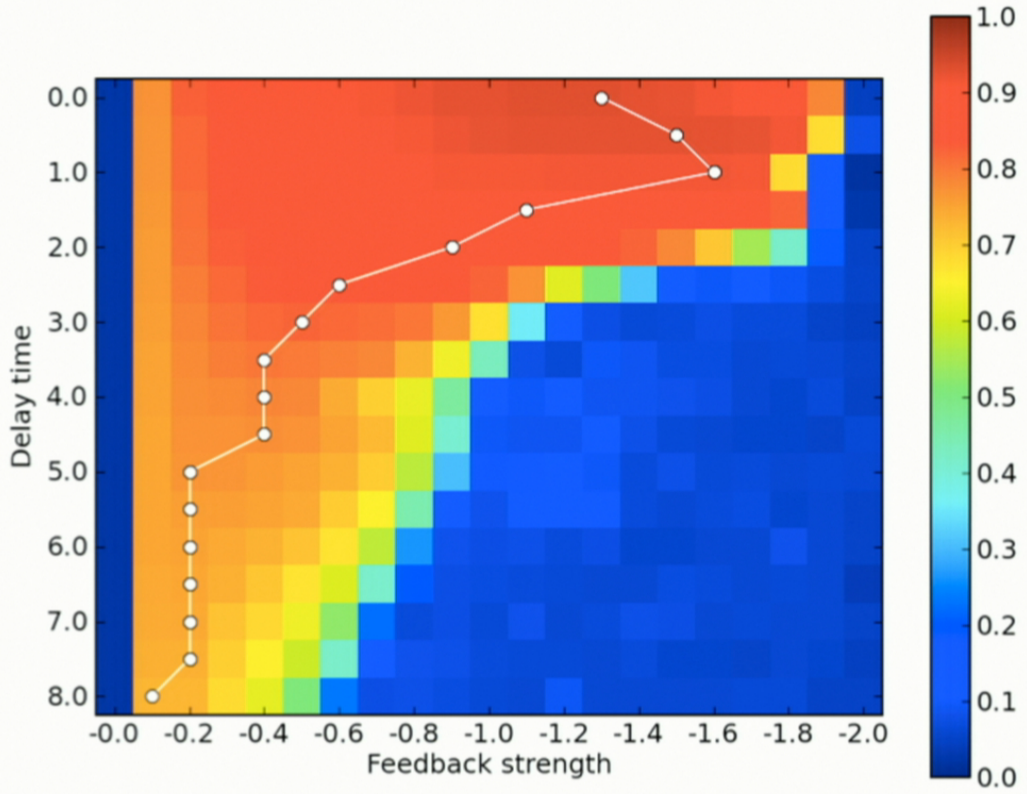


unphased (black) vs. phased (red)



phasing eff vs time delay, feedback strength

real data (4 sec integrations), simulated phasing (Christiaan Brinkerink)



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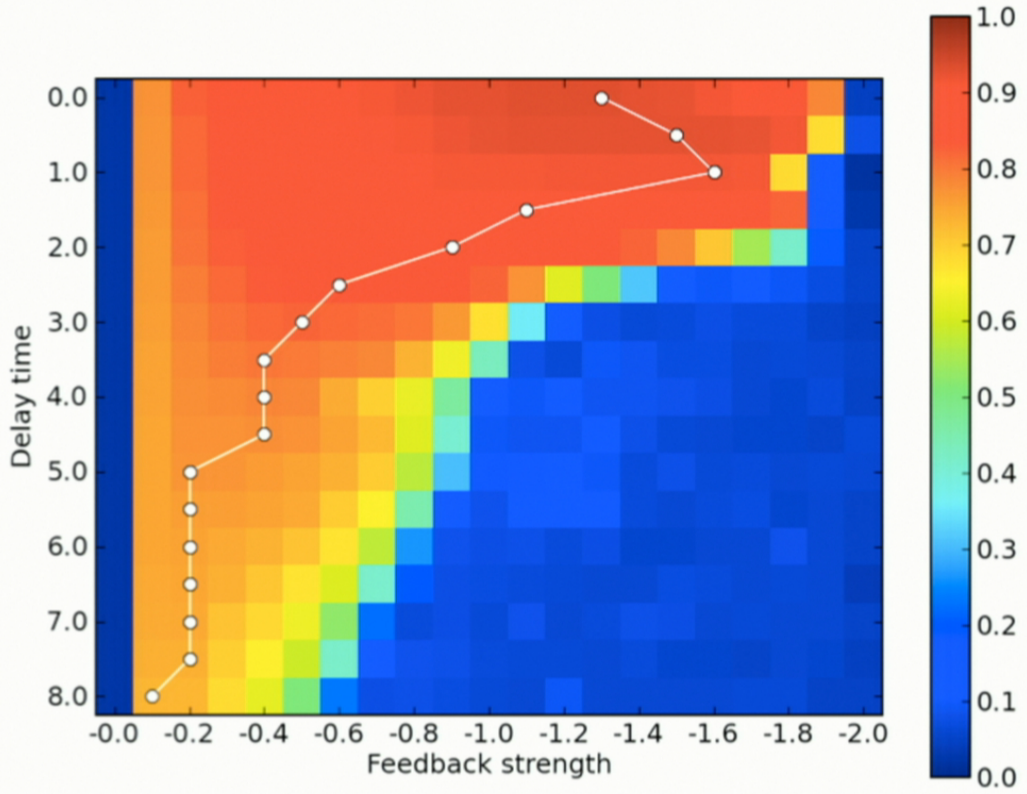
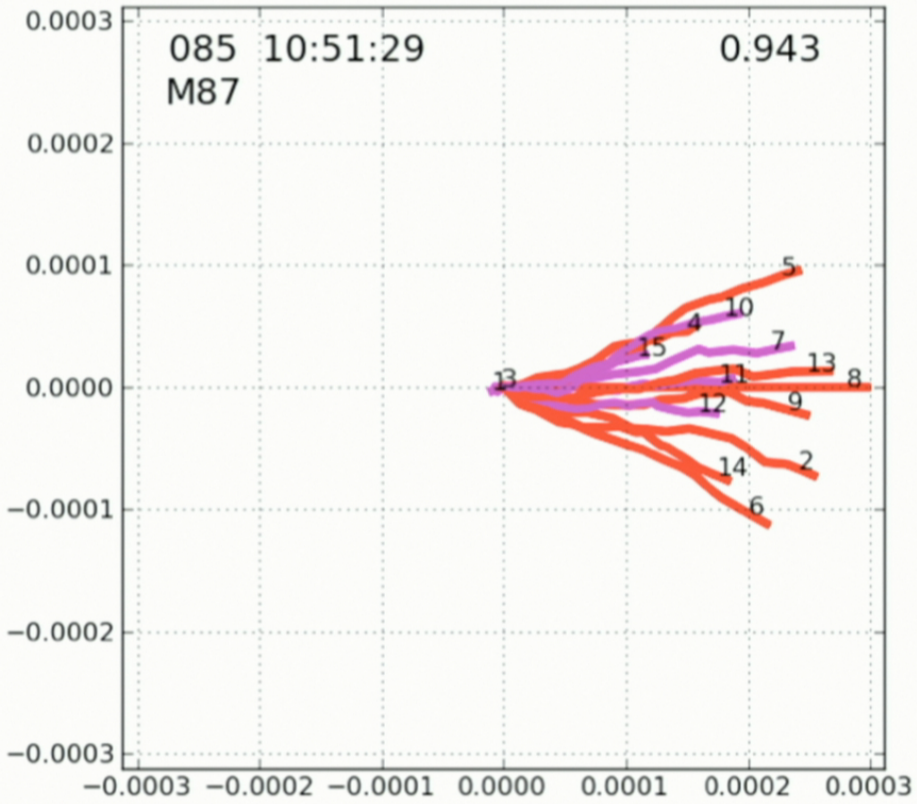
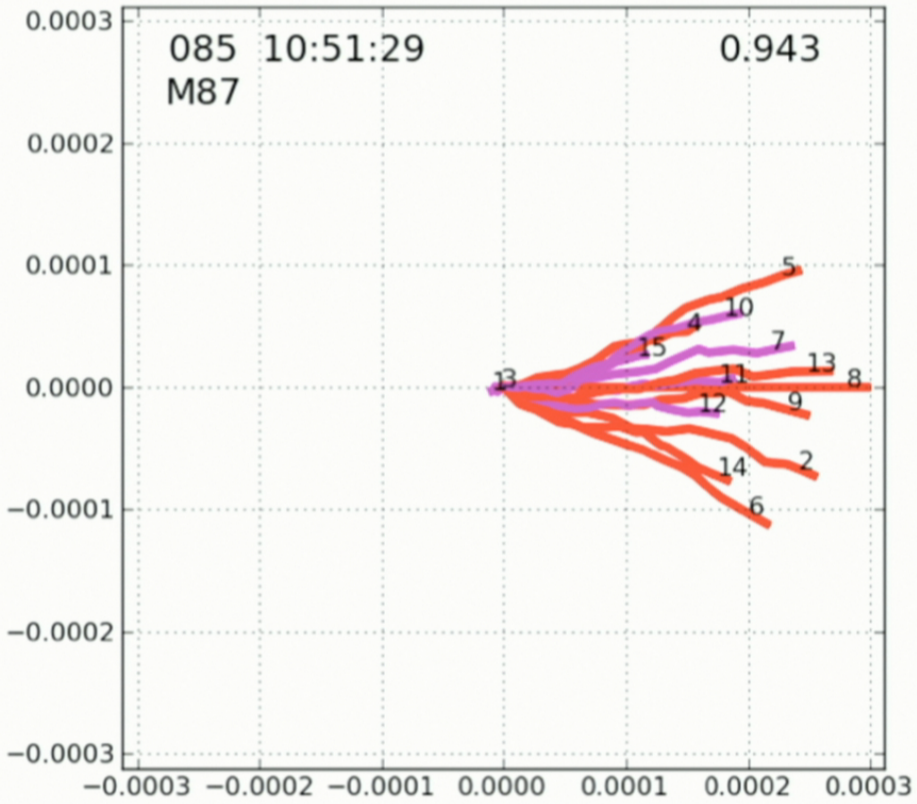


phasing diagram



- visualizes selfcal solution from previous 10-sec integration
- 1 “SNR” vector per antenna
- 16 segments/ vector (spectral windows)
- red: included in phased sum

phasing diagram



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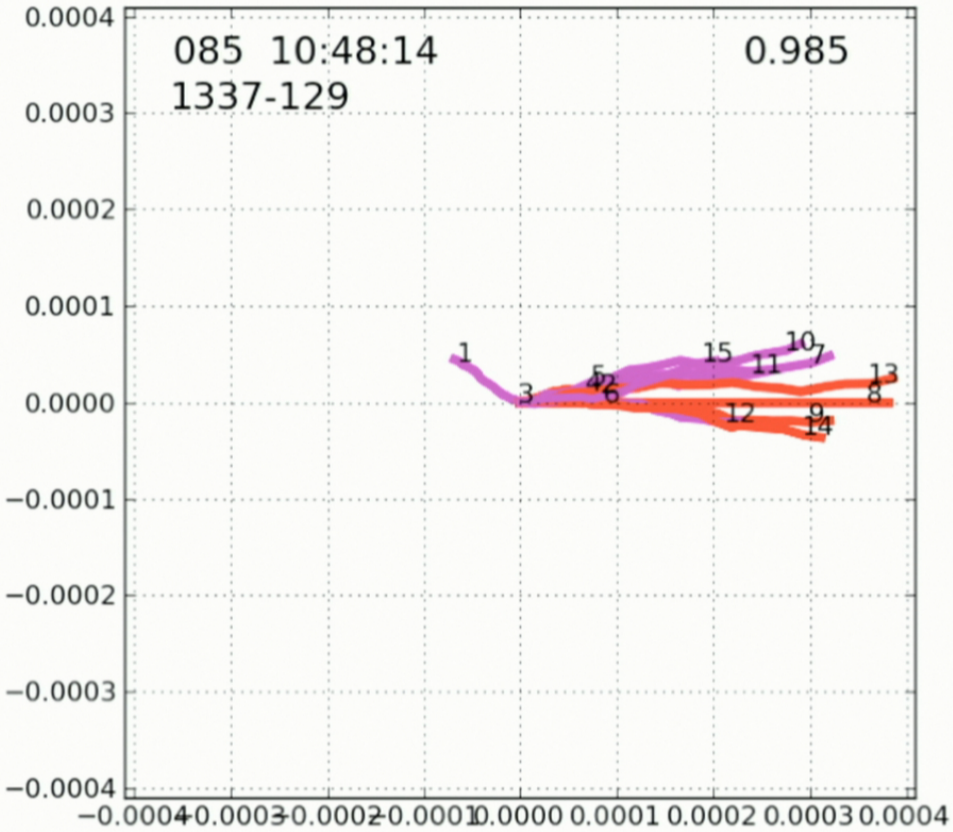
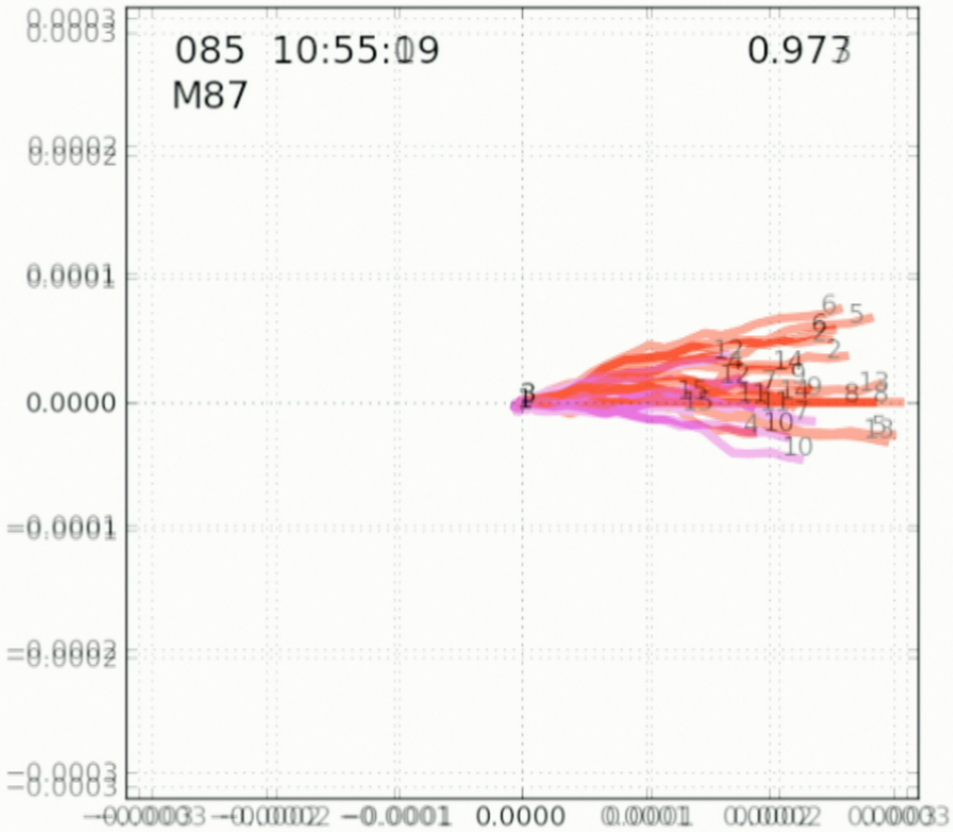
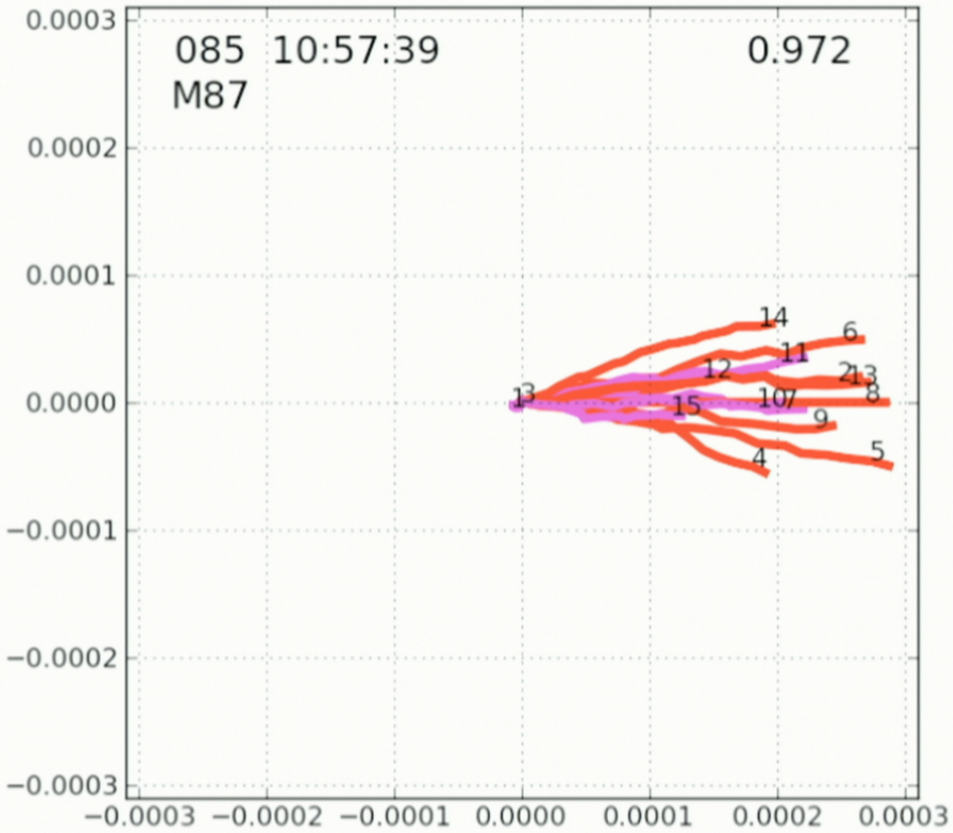
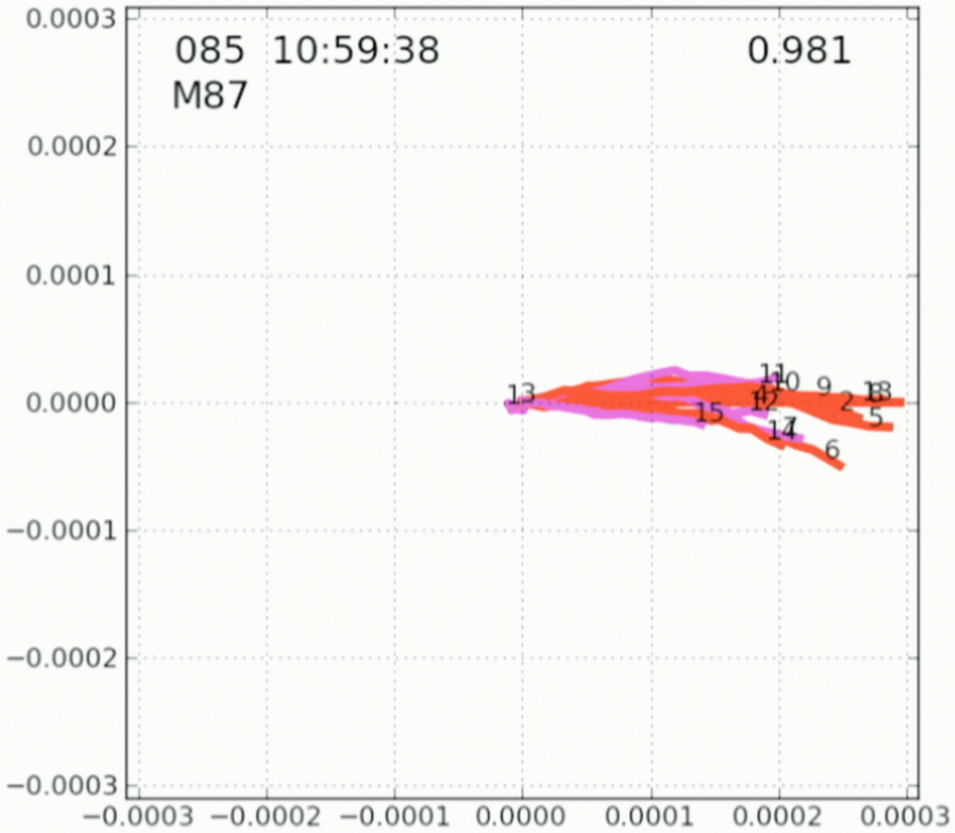
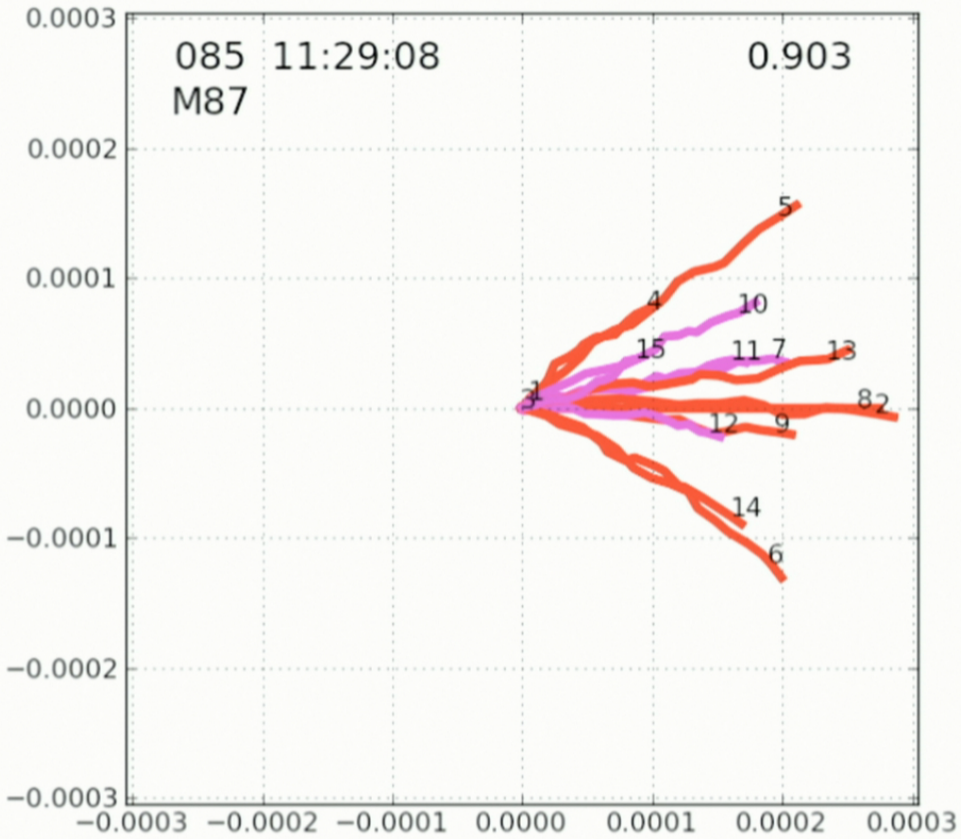

085 10:48:14
1337-129
0.985
0.0004
0.0003
0.0002
0.0001
0.0000
−0.0001
−0.0002
−0.0003
−0.0004
−0.0004 −0.0003 −0.0002 −0.0001 0.0000 0.0001 0.0002 0.0003 0.0004
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

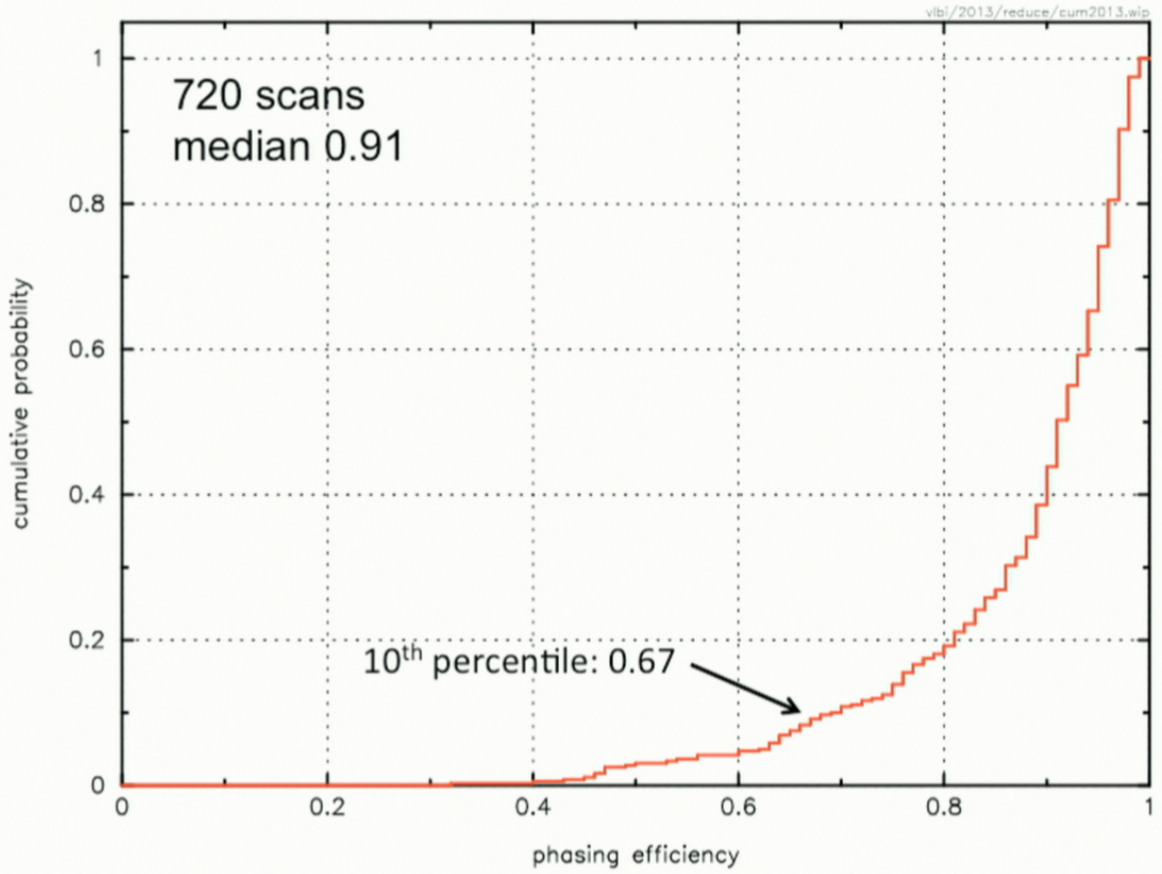

085 10:55:09
M87
0.973
0.0000
−0.0001
−0.0002
−0.0003


085 10:57:39
M87
0.972
0.0003
0.0002
0.0001
0.0000
−0.0001
−0.0002
−0.0003
−0.0003 −0.0002 −0.0001 0.0000 0.0001 0.0002 0.0003
14
6
11
12
2
13
1
3
8
15
10
7
9
5
4


085 10:59:38
M87
0.981
0.0003
0.0002
0.0001
0.0000
−0.0001
−0.0002
−0.0003
−0.0003 −0.0002 −0.0001 0.0000 0.0001 0.0002 0.0003

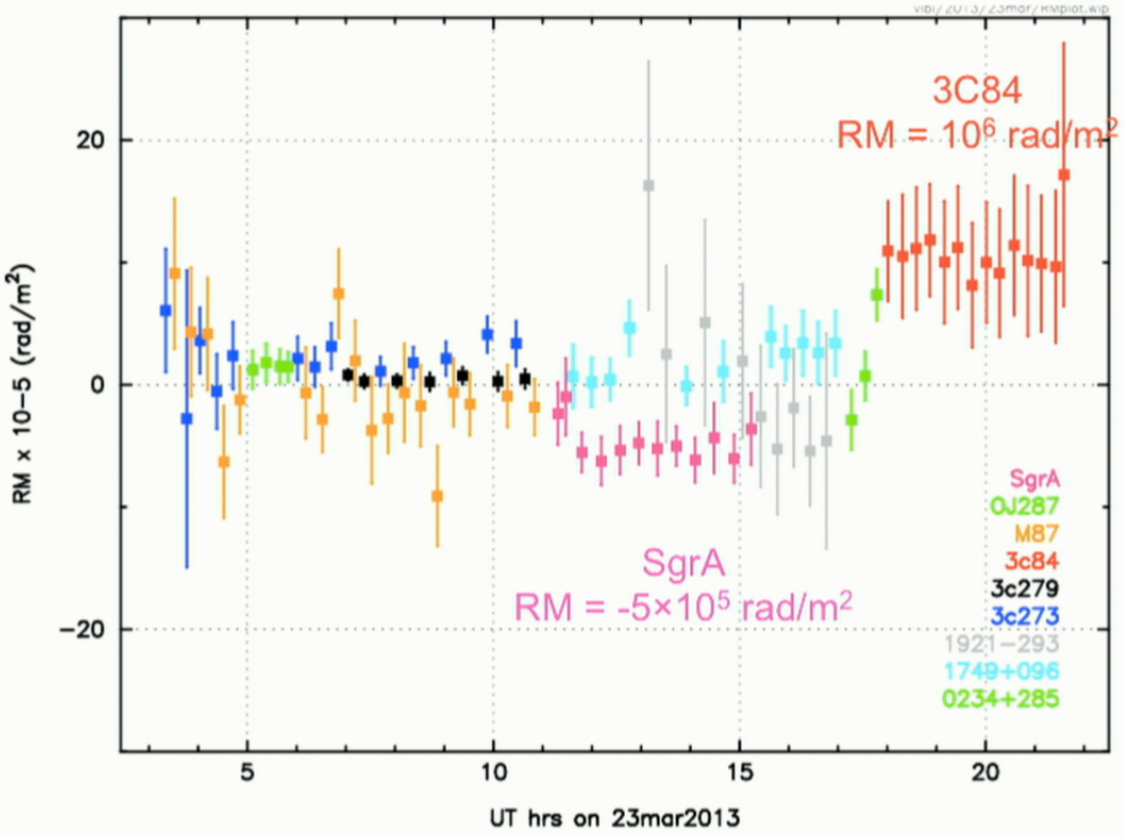

085 11:29:08
M87
0.903
0.0003
0.0002
0.0001
0.0000
−0.0001
−0.0002
−0.0003
−0.0003 −0.0002 −0.0001 0.0000 0.0001 0.0002 0.0003
5
4
10
15
11
7
13
3
8
2
12
9
14
6

cumulative phasing efficiency, 2013 experiment



plambeck 7-Aug-2013 19:22

serendipitous discovery of Faraday rotation toward 3c84 (from local CARMA data)



March 2015

- double size of beamformer to take advantage of all the analog downconverters (16 Gb/s)
  - 2 GHz × 2 polarizations, phased sum of 8 ants
  - Berkeley has all needed iBob and BEE2 boards
  - Haystack will provide FiLa 10G boards to convert from VSI to VDIF for Mk6 recorders
- also record 16 Gb/s from comparison antenna
  - use CARMA downconverters or standard block downconverter? R2DBE?

2016 and beyond…