

ALMA LOCAL OSCILLATOR DISCUSSION -- 1999-Sep-10, teleconference  
Summary by LRD, 1999-Sep-13

Attendees:

CHO Eric Bryerton, Skip Thacker, John Webber  
SOC Durga Bagri, John Battle, Bill Brundage, Dick Sramek  
TUC Larry D'Addario, Darrel Emerson, Graham Moorey, John Payne,  
Simon Radford  
KP Bill Shillue

The meeting was devoted to the selection of a baseline design for the first LO. The list of pro-con considerations prepared by D'Addario on Sep-02 was reviewed. (In accord with the results of a brief meeting held on Sep-07, we will refer to the options as I,II,III rather than using the names given in D'Addario's memos and block diagrams. No agreement was reached on the appropriate names.) Some of the comments were:

. In Opt II, Thacker suggests a minimum photodetector output of 100 nW, assuming 2000K noise temperature mixers.

. In response to questions, D'Addario agreed that the two-laser synthesizer has not been experimentally shown to have phase noise as low as can be obtained from one intensity-modulated laser. But published results show that it can be made good enough for our purposes, and those working on it believe that the residual phase-difference noise will be truly negligible when the loop bandwidth greatly exceeds the laser line widths.

. Shillue points out that receiver construction is greatly simplified with Opt III.

. Webber points out that Opt II appears to be more expensive than Opt I in the draft block diagrams, but this may be reversed when Opt I is revised to obtain finer tuning resolution, as seems to be required.

. Webber reports that the CHO group has a preference "marginally favoring" Opt I as the baseline.

In the end, Emerson decided to declare Opt II to be the project baseline. (That is: Synthesis and distribution of 28-122 GHz centrally, with PLL at each antenna to reach higher power and with out-of-loop multiplication for higher frequencies; transmission of synthesized signal as difference between two phase-locked lasers.) Work will continue on high-power mm and sub-mm photodetectors for Opt III. Round-trip line length correction development is common to Opt II and Opt III, so it too will continue. Many other components (multipliers, amplifiers) are common to Opt I and Opt II, so work on them is also unaffected by this decision. Development specific to Opt I, including the antenna-based synthesizer, will be suspended for now.

Action: D'Addario to revise the pro-con list to include comments received.

