

Subject: Re: rx calibration**Date:** Thu, 31 Aug 2000 16:43:34 +0200 (METDST)**From:** guillote@iram.fr (Stephane Guilloteau)**To:** guilloteau@iram.fr, wild@astro.rug.nl**CC:** awootten@nrao.edu, rkurz@eso.org, rbrown@nrao.edu, R.Wade@rl.ac.uk, alma-jrdg@eso.org, carter@iram.fr

Dear Wolfgang,

I have been working on that problem since a couple of weeks, and have sent a few messages around (to AI and to the Management). Here is a copy of the later one:

I may be unable to join the teleconf today also.

However, let me re-insist on the decision making process for the Calibration system in the receiver design. Unless I have been mislead, there is a request (or there will be) from the Receiver group for a design with no cold calibration load in the dewar (and no associated optics).

I re-emphasize that such a decision is yet unfounded. Dick Plambeck produced a very good memo showing the limitations of the various schemes, but this scheme does not consider possible secondary calibrators (which are required because of pointing, focus, phase noise). All proposed schemes failed to match the 1 % precision.

I summarize the current situation here

- a) there exist a receiver design with a cold load.
- b) Dick does not treat the case of a "chopper" at 80 K, which would give the best results at 110 GHz and 230 GHz by minimizing the gain compression.
- c) The sub-reflector calibration has two major drawback
 - 1) measuring the coupling to 1 % accuracy is not yet proven. Current BIMA results are at the 10 % level.
 - 2) The device must chop FAST (10 Hz or so) to avoid contamination by atmospheric fluctuations during the measurement. This has to be quantified yet (I am working on that).
- d) The goal of 1 % accuracy DOES SEEM OUT OF REACH. However, a 2 or 3 % accuracy may be possible, and the technical solution depends on the required precision specification.
- e) While absolute calibration at 1 % seems out of reach, relative calibration at that level seems possible, but no complete analysis is available yet.

In summary, I (strongly as you already guess) feel that discarding the cold load at the current stage is totally premature. If the receiver group wishes to freeze the design known, I argue they have to provide a cold load. Wether the cold load will be ultimately implemented or not still remains to be checked.

Let me further mention that Jeff's memo has an error (there is an inhomogenous equation), so that his numbers can't be trusted without further check.

I would like from the receiver group inputs on the following questions:
- how can you quantify the receiver gain compression (lab measurement ?
tabulated values ?)

- in the subreflector calibration scheme, what process can give a 1 % or better accuracy on the coupling coefficient ?
- What possibilities does the receiver group have to measure the sideband gain ratio (lab measurement + tabulated values ?). How do you expect this number to vary with tuning parameters ?

Another question going to the Systems and Antenna group is

- What reliability do we expect from a 10 Hz chopping device running permanently in the sub-reflector ? What servicing and maintenance will be required ?

The Calibration process is a topic on the ASAC, scheduled Sep 9-10, and I would like to defer any decision after the ASAC discussion on that issue. I thought the latter request had been mutually (though informally) approved.

Best regards

Stephane