1 Finding Calibrators for the observations

Calibrators are objects whose interferometric observables ($V^2(\lambda)$, Differential Phases, phase closures...) are known with a much larger accuracy than the accuracy needed by the observations on a "science" object. Hence, observed in more or less the same observing conditions (as near in time as possible, with as nearly the same projected baseline setup, etc...) as the science object, they provide the absolute reference that permit to correct the "science" interferometric observables from (most of) the biases and sytematics. (this is comparable as the photometric standards used in photometry).

In a (simplified) case of the visibility for example, if $V^2_{measure-science}$ is the measured (squared) visibility on the "science target", and V^2_{system} is the visibility (loss) induced by the atmosphere and instrumental effects, one has:

$$V^2_{science} = V^2_{measure-science}/V^2_{system}$$

and, for a calibrator

$$V^2_{calibrator} = V^2_{measure-calibrator}/V^2_{system}$$

so that, if $V^2_{calibrator}$ is known (with a good model for example, or with previous observations of excellent quality), one has the desired $V^2_{science}$ by dividing $V^2_{measure-science}/V^2_{calibrator}$

Calibrators serve to follow the vagaries of V^2_{system} during the night, and more generally, to monitor the health of instruments. The simplest calibrator is a very unresolved object, for which $V^2_{calibrator} = 1$ whatever λ and the baseline.
→Why is it not always possible to use such a simple calibrator?
Since unresolved calibrators are small and thus possibly too faint, it is possible to use even resolved objects, providing the accuracy on their angular diameter is sufficient to enable a good precision on the "science" object visibility.

There are a few utilities available that will find the stars with known diameter around your science object. (Why around?)., and extimated the error using this or that star as a calibrator will induce on the precision of the science mesurement.

We will use the SearchCal tool (normally hosted on the JMMC server `http://www.jmmc.fr`), but accessible here by typing `SearchCal`. A panel appears.

1.1 The SearchCal panel

Usually one fills the upper panel (demonstration) to get the alibrators for the science star. Here we do not have the network, so we will use the facility provided by SearchCal to load previous results. The files are stored in `/home/school/tutorial/SearchCal`.

Load `Achernar-K-Bright.scvot`

1.1.0.1 the result panel and Filter buttons How many stars were found? How many are selected? What was the reasons several stars were not selected?

Colors in list: they have a meaning. For example, what is the originating catalog for the JHK magnitudes of HD14641? What is the confidence index of the corresponding visibility? Why such a low (far from V=1.0) visibility?

1.1.0.2 Other buttons Use the "SHOW DETAILS" button to see all information. Use the "SHOW ALL RESULTS" to see a complementary list of stars that were not selected as good calibrators because of their multiplicity or variability flags.

1.1.0.3 MIDI calibrator We will now find the calibrators for Achernar, but observed with MIDI at 10μ. Normally, one would Select MIDI+UT, recall the "Search Calibrators..." menu, enter the Achernar 10μ magnitude: -1. here we load the file `Achernar-N.scvot` The panel is sligtly different. Get the result. Discuss.

The calibrator found is closer than at K, and has a better visibility. Why?

1.1.0.4 Fainter Star, K band, method "Bright" Let's go back to VLTI+AMBER, in K band, but with a fainter star, Gl551 (mag K=5.28). SearchCal has a special search mode for faint stars. File `Gl_551-K-Bright.scvot` is the result of a search in "Bright mode", where the sky was searched on an area of 4 hours by 20 degrees.

Same questions as in section 1.1.0.1. The visibilities are now better (for a calibrator). Why? What would be your final choice in that list for the Gl551 star? remember, it is AMBER and the science target is mag K=5.28.

Use the "sort above list" subpanel to sort the list according to the various sorting parameters.

1.1.0.5 Fainter Star, K band, method "Faint" File `Gl_551-K-faint.scvot` is the result in "Faint mode", using another method involving different sky catalogues. The result is found in a quick search of only 1 degree radius. Is it sufficient for our purposes?