Update to the HIFI beam efficiencies in HSpot

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As users of a heterodyne instrument you are aware that the conversion of the signal from the sky into antenna temperatures $T´_A$ depends on the source size and the main beam or aperture efficiencies. HSpot and the latest HIFI pipeline use the corresponding beam efficiencies. Updated values to these numbers have been provided by measurements of Mars in June 2010 as described in

http://herschel.esac.esa.int/Docs/TechnicalNotes/HIFI_Beam_Efficiencies_17Nov2010.pdf

The main beam efficiencies are also used in HSpot to estimate the baseline noise on a main-beam temperature T_{mb} scale during observation planning. While the new beam efficiencies will be available in the downlink as of HIPE 5.1, the HIFI ICC plans to apply the latest values in the time estimation for all Observing Modes, starting with HSpot version 5.2.2. This will improve the accuracy of the noise estimation and reduce this systematic component of the error budget when comparing processed data with predicted noise performances.

We inform you that since the beam efficiencies are generally better than previously adopted from ground-based estimates in most LO bands, overall there is a corresponding reduction in the amount of observing time required to reach the same noise goals. The overall improvement to observing efficiency is around 10%. In HSpot terms, AORs with noise-based goals require less time to achieve, while time-based goals achieve lower baseline noise. Therefore we encourage you to check the times and noise predictions in HSpot 5.2.2 or later so that you have the latest predictions when examining the quality of the data, and if you believe that the unscheduled portion of your program may be able to benefit from the improvements in observing efficiency. Proposed program adjustments should be coordinated via the HSC helpdesk.

Please keep in mind that when a noise goal is requested, it is occasionally being met with an observing time that provides substantially better noise performance than targeted. While observing efficiencies improve overall with the new beam parameters, the new optimization should still meet the goal but may occasionally result in relatively higher predicted noise values than before (i.e., a smaller difference between the User's input goal and HSpot's output predicted noise levels), giving the appearance of a relative decrease in noise performance. It is the Observer's responsibility to be aware of how the required noise performances and whatever needed margins are being met.

Finally, please note the general exception to the above, that the beam efficiencies in Band 5a/5b are somewhat worse than previously adopted, translating into an overall increase of the noise by ~5% for time-based goals.

Best regards,

Your friendly HIFI support