FLITECAM Imaging Modes

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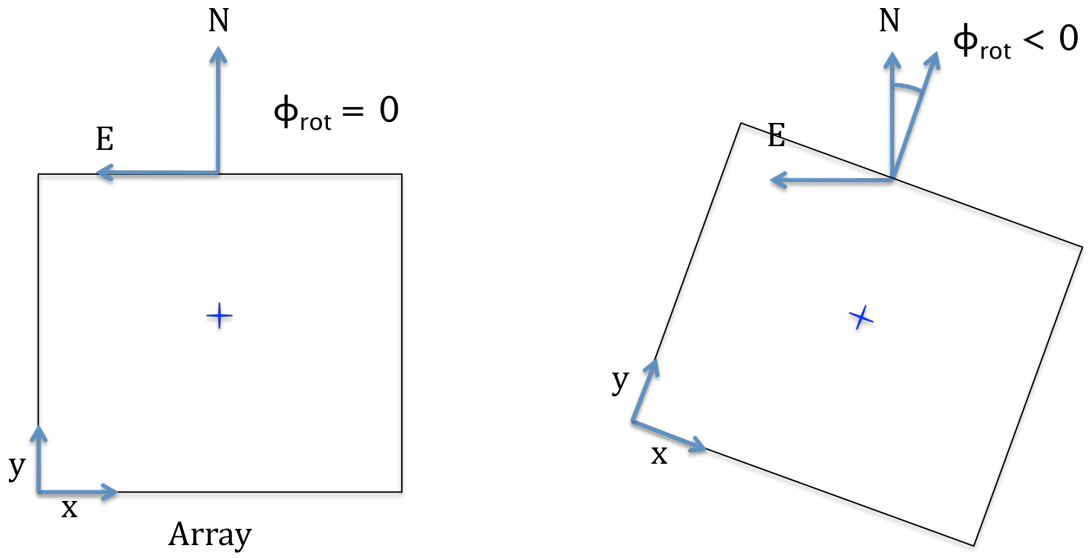
The First Light Infrared Test Camera (FLITECAM) is an infrared camera operating in the NIR (1-5.5 μm) passband. It consists of a 1024x1024 InSb array with 27 μm pixels, corresponding to a plate scale of 0.475 arcsec/pix and a field of view of ~8 arcmin x ~8 arcmin. Because the background levels are not expected to be high with FLITECAM on SOFIA, the chopping secondary is not moved (i.e., there is no chopping) with this instrument. (This is in contrast to the other longer-wavelength instruments for SOFIA.) Therefore, as with most ground-based NIR imagers, there are only two basic imaging observation modes with FLITECAM: STARE and NOD_OFF_ARRAY.

In the diagram for the NOD_OFF_ARRAY mode shown below ϕ_{rot} is the rotation angle of the array on the sky. In all diagrams, North is up and East is left. Positive angles increase from North through East, in the standard astronomical manner. For consistency with the FORCAST documents, however, the rotation angle ϕ_{rot} is shown with a negative value.



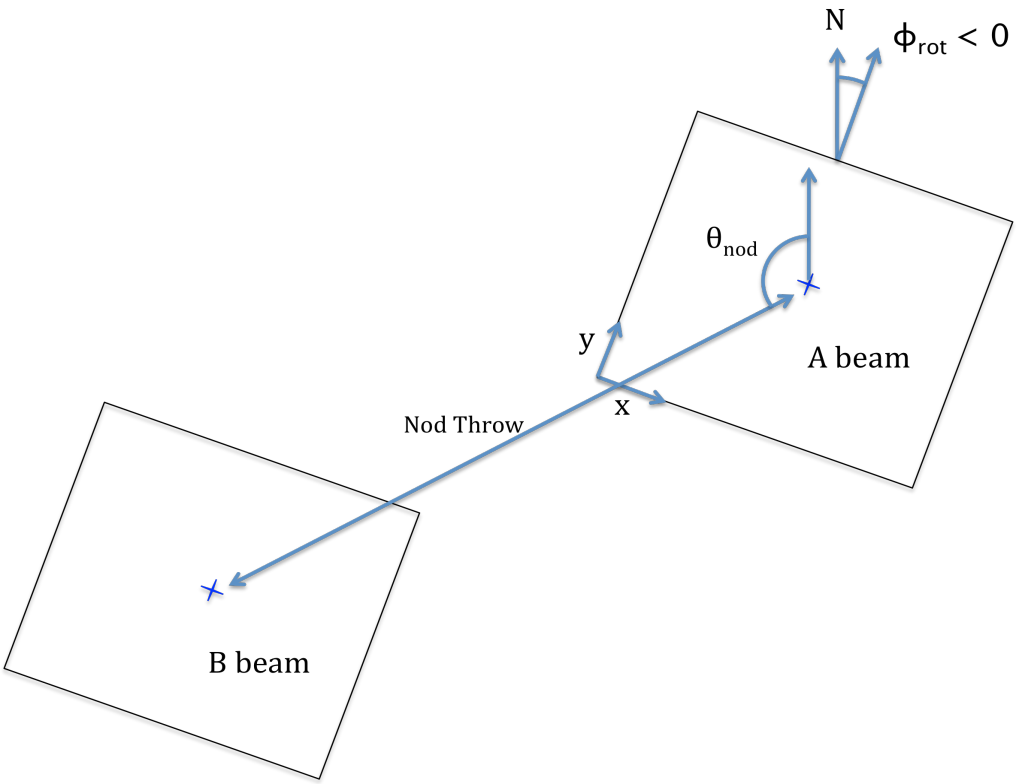
STARE Mode

In STARE mode, an observation is made without moving the telescope (or the secondary), in a manner similar to the kinds of observations made in the optical. This mode is typically used for observing point sources or compact sources that do not occupy a large region on the array. In this case, the telescope is usually moved a small amount (known as dithering) between successive images. The flat field and sky frames are then generated from the dithered observations themselves. The dither movements must be larger than the typical size of the object(s) being observed, otherwise the sky frame will contain excess emission from the location where the source overlaps in the two images.

NOD_OFF_ARRAY Mode

In this mode, which is often used for extended objects, or for regions with large numbers of point sources distributed across the field, an image is taken of the source field (nod position A) and then the telescope is moved (nodded) off the source to a region without any sources ('sky' region at nod position B). Then the telescope is moved back to the source, a small adjustment to the position is applied (a dither) and the sequence is begun again. The typical observing sequence is A-B-B-A, but A-B-A-B is also frequently used. Interleaving the source and sky frames in this manner is a way of tracking the variations in the sky levels and thereby improving the quality of the sky subtraction and flat fielding. The frames acquired in the sky position are then combined to generate the sky background frame and the flat field frame. These are subtracted from and divided into (respectively) the individual source frames. After sky subtraction and flat fielding, the source frames can be aligned and combined. If the integration times are short, it can be more efficient instead to obtain a set of dithered images of the source region (A-A-A-…) and then move the telescope off the source to the sky position and take another set of dithered images (B-B-B…).

The NOD_OFF_ARRAY mode is similar to the C2NC2 mode used for FORCAST observations with the obvious exception that chopping is not used for FLITECAM observations.


N
$\phi_{rot} < 0$
θ_{nod}
y
x
A beam
Nod Throw
B beam