ISSUE #4

Newsletter

30 April 2025

Preliminary performance forecast for the QUBIC prototype (Part 1)

by Elenia Manzan

We identified four sky regions, shown in Fig. 1, that are of interest for the QUBIC prototype. These regions are near the centre of our Milky Way, where the sky signal is very bright, and should allow us to test the ability to reconstruct sky maps and perform spectral imaging with bolometric interferometry in intensity.

Based on the (white) noise properties of the QUBIC prototype, we computed the expected signal-to- noise ratio (S/N), assuming different observation durations. Fig. 2 shows the simulated S/N for the four aforementioned regions after 200 days of observation (approximately six months). Red pixels correspond to higher S/N values, suggesting that the prototype should be able to measure their signal. This result indicates that, after observing any of the four sky regions for six consecutive months, we should be able to recover the intensity over a large fraction of the covered area.
The result further improves for longer observations.

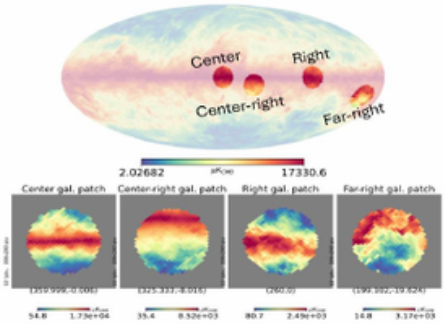

Fig. 1 Top: simulated sky signal in the frequency range of the QUBIC prototype (in transparency) and the four selected sky regions close to the galactic plane, which lies at the centre of the image and dominates the emission. Bottom: close-up of the sky signal in the four selected regions. Red pixels represent brighter areas.t

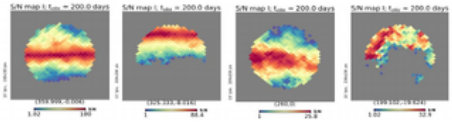

Fig. 2 Expected signal-to-noise ratio (S/N) for the four sky regions assuming approximately six months of constant observation. Pixels with a S/N < 1 are shown in gray, along with those outside the region. Pixels with S/N > 1 are coloured frommblue to red. Red pixels have the highest S/N, suggesting that the QUBIC prototype should be able to measure them.

To be continued in Newsleter # 5

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QUBIC is an international Collaboration including France, Italy, United Kingdom, Ireland and Argentina