

NOEMA heterodyne receivers performance and tuning optimization

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The NOEMA interferometer located in the French Alps at 2500m altitude, currently operates 10 antennas having 15m of diameter with the 11th antenna coming out in April 2020 and the 12th and last one in 2021.

The receiver cabin is equipped with a single closed cycle cryostat (see Fig. 1), containing 4 heterodyne frequency bands, covering the 70-375 GHz frequency range. It is cooled down using a 3-stage GM cooler from Sumitomo Heavy Industries, Ltd. The end temperature is typically below 3K, ensuring the SIS junctions operate in the 3.5-4.5K temperature range.

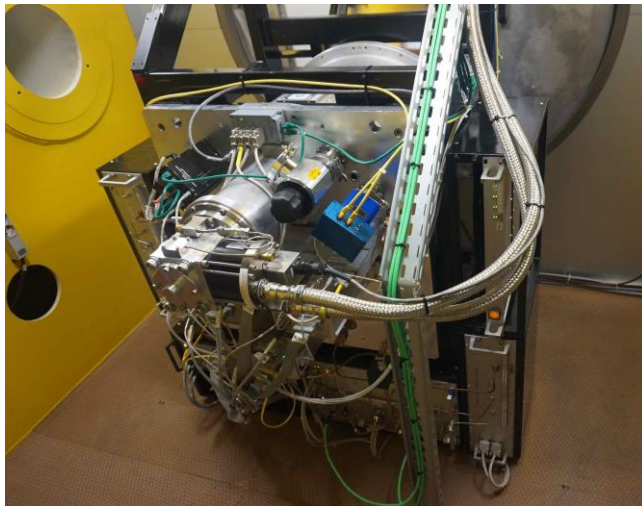


Fig. 1. Receiver installed in the 10th NOEMA 15m antenna. All critical electronics is directly mounted on the top plate.

We will present an overview and summary of the receivers performance gathering results after several years of operations. We will also show the statistics for the receiver tunings over the past years assessing tuning quality, tunings which required manual intervention and finally total required tuning time.

As observing time is very expensive, any gain in improving on source observing efficiency is beneficial. Therefore, we will also show improvements and optimizations of the automated tuning procedures performed in 2019 allowing to further improve the overall tuning reliability, quality and total duration. Finally, we will present the next planned steps to further improve it.

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