Investigation of the 2.3 MHz Ripple at C-band
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Setup

The goal was to investigate the 2.3 MHz ripple, detected at L and S-band, at C-band. This ripple appears to be caused by reflections from the main reflector and subreflector.

The signal path consisted of channel 1 (X linear polarization) and channel 2 (Y linear polarization) connected to optical driver modules (ODMs) 1 and 3 (ODM 2 had too much power and ODM 7 was out of service), converter modules 1 and 5, and sampler filters 1 and 5, respectively. The IF rack filters were 2360-3540 MHz and the analog filter rack filters 800-1600 MHz. The spectrometer was configured with two samplers (0 and 1), a bandwidth of 800 MHz, 2048 channels ($\Delta\nu = 391$ kHz), and an integration time of 30 sec (1W2-001-800).

Continuum Source Spectra (0137+3309)

The continuum source 0137+3309 (3C48) was observed using the *xonoff* procedure where 5 min was spent on the source and 5 min off the source. 0137+3309 has a flux density of ~ 5.4 Jy at 5000 MHz. Figure 1 shows an averaged spectrum centered at a sky frequency of 5000 MHz consisting of eight on-off pairs. As noted earlier an ~ 60 MHz ripple exists in both polarizations. It is not clear whether this is related to the intermittent 60 MHz ripple observed in the IF system. The 2.3 MHz ripple is barely visible in the magnified lower panel plot.

Figure 2 plots the Fourier transform of the spectra in Figure 1. There appears to be a signal just under 10 MHz which is stronger in receiver channel 1. The 2.3 MHz ripple is present in both polarizations. The ratio between the normalized power in the 2.3 MHz signal at 1990 MHz ($\frac{4.0}{3.6\times10^{7}}$) to the signal at 5000 MHz ($\frac{2.5\times10^{-3}}{1.5\times10^{5}}$) is 6.7. This is approximately equal to the ratio of the wavelenths squared $(\frac{5000}{1990})^2 = 6.3$. Figure 3 show a magnified view of the Fourier transform for receiver channel 2 (Y linear). The broad, weak ~ 1.6 MHz ripple detected at L-band might be present.

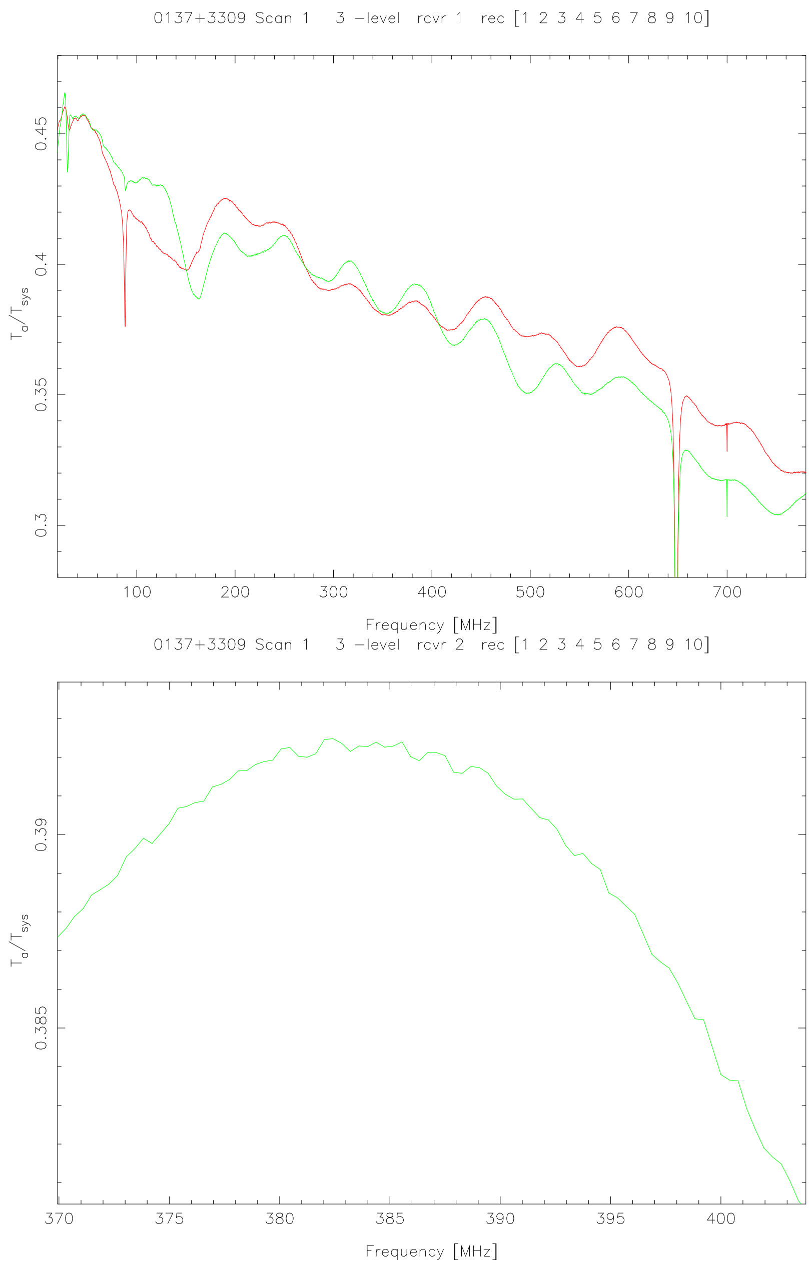

Figure 1: Project TBASEDSB021219, scans 1-16. Spectra for eight on-off pairs towards the continuum source 0137+3309, centered at a sky frequency of 5000 MHz. The red and green curves correspond to receiver channels 1 (X linear) and 2 (Y linear), respectively. The lower panel shows an expanded view.

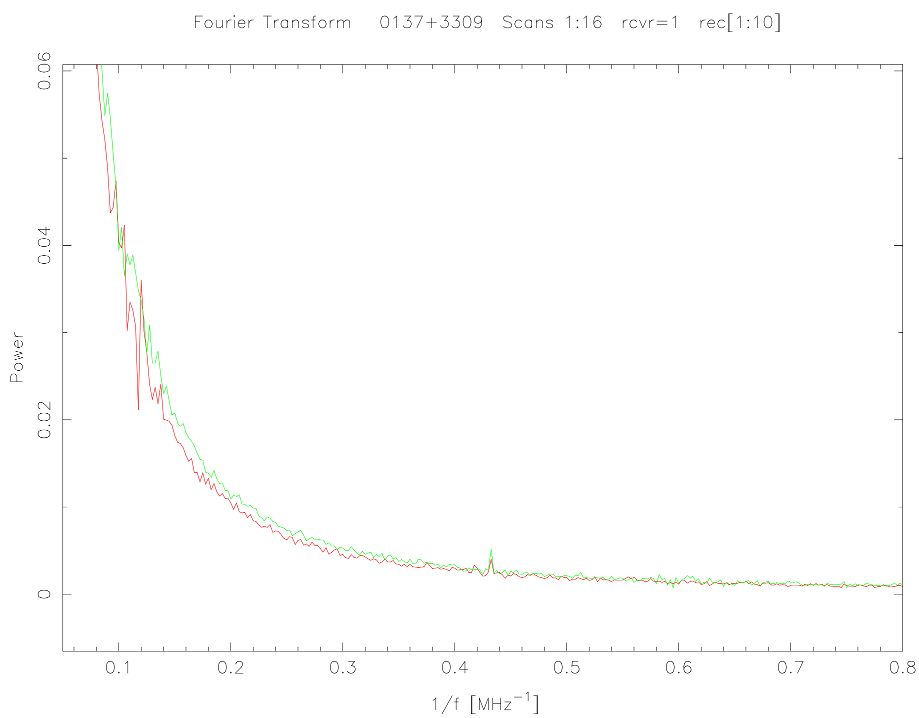

Figure 2: Project TBASEDSB021219, scans 1-16. The Fourier transform of the spectra in Figure 1. The red and green curves correspond to receiver channels 1 (X linear) and 2 (Y linear), respectively.

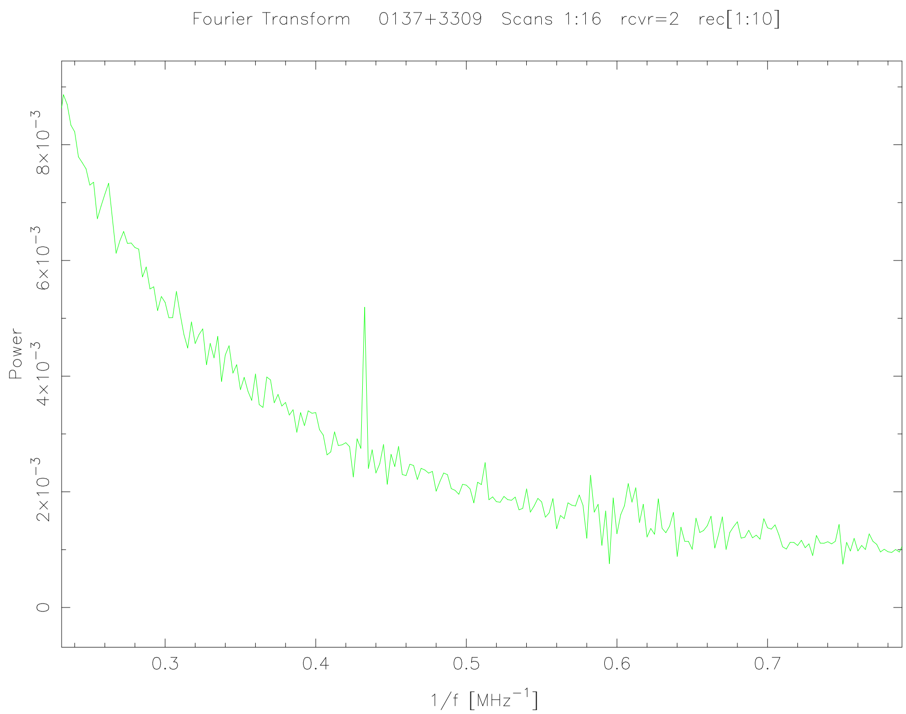

Figure 3: Project TBASEDSB021219, scans 1-16. The Fourier transform of the channel 2 (Y linear polarization) spectra in Figure 1.