Preliminary Rejection of Gaussian Models for the Global 21-cm with EDGES High-Band (ongoing work)

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Here I show preliminary constraints on the absorption trough modeled as a Gaussian in redshift, i.e.:

\[ T_b(z) = T_{21} \exp \left[ -\frac{4(z - z_r)^2 \log(2)}{(\Delta z)^2} \right]. \]  

The foregrounds are modeled with a 5-term EDGES polynomial. The average spectrum was produced with data between 2015-207 and 2016-90. The nominal calibration consists, among others, of:

2. Spectrally flat, 0.5%, ground loss.
3. Nominal beam model from FEKO GF, using a plus-shaped ground plane.
4. Correction for receiver temperature.
Figure: (1): TOP: Measured sky brightness temperature. BOTTOM: Residuals after fitting and removing a 5-term EDGES polynomial from data in top panel. These residuals have a weighted RMS of 16 mK. This average spectrum is an improvement to the one presented in Report 78 (http://loco.lab.asu.edu/loco-memos/edges_reports/report_20161123.pdf).
Gaussian Model for the Absorption Trough

Figure: (2): Examples of the Gaussian model for the absorption trough. All of them have an amplitude of $-150$ mK. From top to bottom, the FWHM of the Gaussian ($\Delta z$) is 2, 4, and 6. The center of the Gaussian ($z_r$) is allowed to descend in redshift while the condition $T_b \approx 0$ at $z = 6$ is met.
Figure: (3): Models rejected at 95% confidence, with a trough amplitude of $-150 \text{ mK}$, are those below the black line and the red line, on the lower left corner. The red line represents the requirement of $T_b \approx 0$ at $z = 6$. Across redshift, and below the red line, the EDGES measurement enables to rule out Gaussians with an amplitude of $-150 \text{ mK}$ with FWHM of at least $\Delta z \approx 3$. 
Figure: (4): Same as Figure 3 but including additional realizations in green that account for calibration uncertainty. This uncertainty does not impact the lower bound of $\Delta z \approx 3$ for a $-150$-mK Gaussian.
Nominal Rejections for Different Gaussian Amplitudes

**Figure: (5):** Same as Figure 3 but for different Gaussian amplitudes.
Sample of Rejected / Non-Rejected Gaussian Models

Figure: (6): TOP: Sample of rejected Gaussians. BOTTOM: Sample of non-rejected Gaussians.