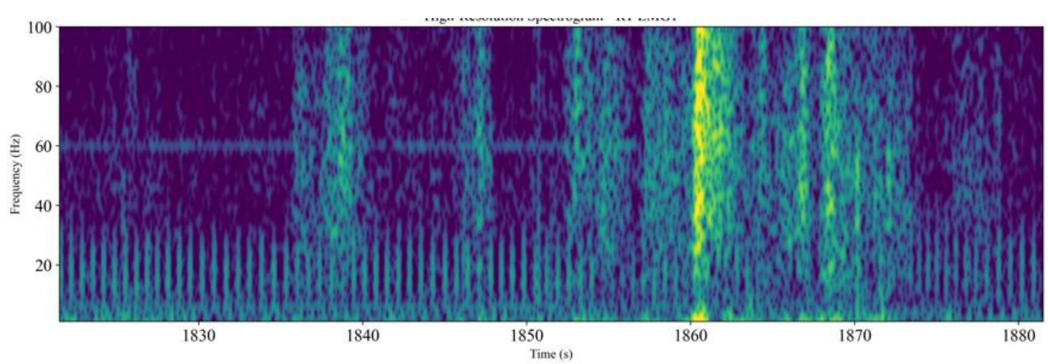
Spectrogram Computation

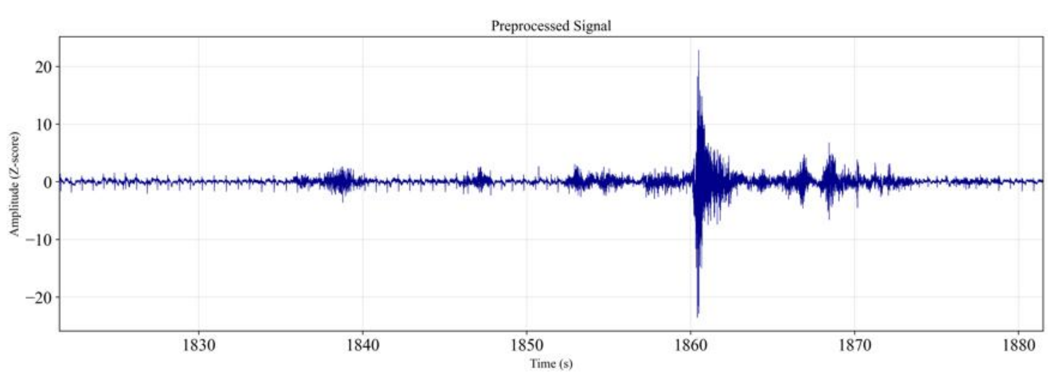
The Torchaudio spectrogram uses an STFT with a 1024-point FFT, Hann window, 87.5% overlap, and power scaling, while the MNE version employs Morlet wavelets with frequency-dependent cycles

Torchaudio Spectrogram Configuration
The spectrogram is computed using torchaudio.transforms.Spectrogram with:
Hann window (window_fn=torch.hann_window)
Centered frames (center=True)
Reflection padding (pad_mode='reflect')
One-sided spectrum (onesided=True)
No normalization (normalized=False)

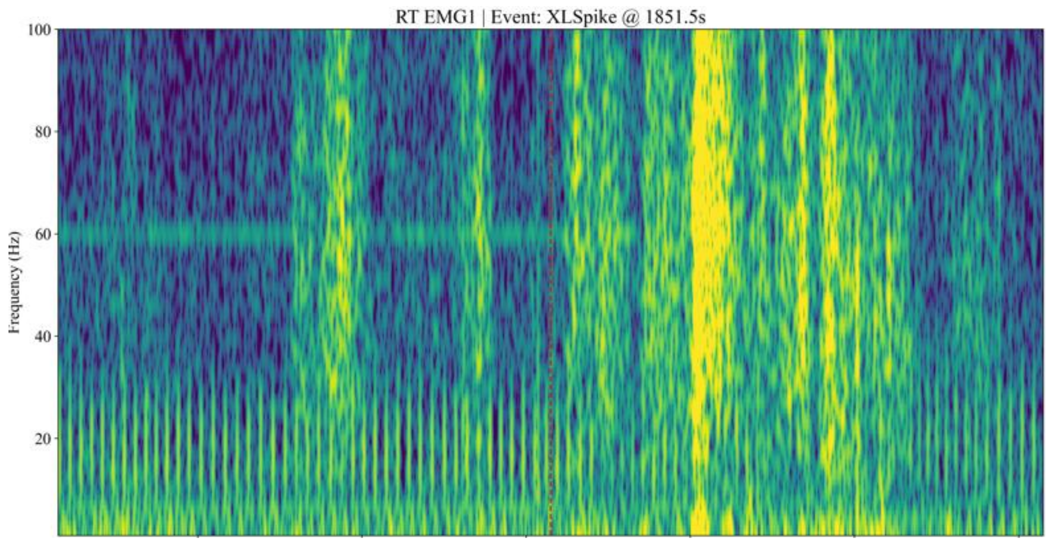
Spectrogram Parameters

1. **FFT and Window Settings**:
   - N_FFT = 1024: Number of FFT points (larger for better frequency resolution)
   - WIN_LENGTH = 512: Window length in samples
   - HOP_LENGTH = 64: Hop size between consecutive windows (87.5% overlap)
   - Resulting overlap: 87.5% (calculated as (1 - HOP_LENGTH/WIN_LENGTH)*100)
2. **Power and Scaling**:
   - POWER = 2.0: Computes power spectrogram (magnitude squared)
   - Conversion to dB scale: 10 * log10(spec + 1e-10)
3. **Visualization Parameters**:
   - CMAP = 'viridis': Colormap for spectrogram visualization





MNE Spectrogram Configuration
n_cycles = freqs / 2.0: Uses wavelet cycles that scale with frequency (more cycles for higher frequencies)
Computes time-frequency decomposition using Morlet wavelets
Uses Morlet wavelet transform (mne.time_frequency.tfr_morlet)
n_cycles = freqs / 2.0: The number of wavelet cycles scales linearly with frequency
Colormap: 'viridis'



Comparison to FFT Approach

Characteristic	**MNE Wavelet Version**	**Torchaudio FFT Version**
Transform Type	Morlet Wavelet	Short-Time Fourier Transform (STFT)
Resolution Control	Cycles per frequency	Fixed N_FFT/Win_length
Frequency Resolution	Better at low frequencies	Uniform across spectrum
Time Resolution	Better at high frequencies	Uniform across spectrum
Window Function	Implicit Morlet wavelet	Explicit Hann window
Overlap	N/A (continuous)	87.5% (HOP_LENGTH=64)