Sonifying Real Pantheon+ Peculiar Velocity Data: An Experimental Analysis

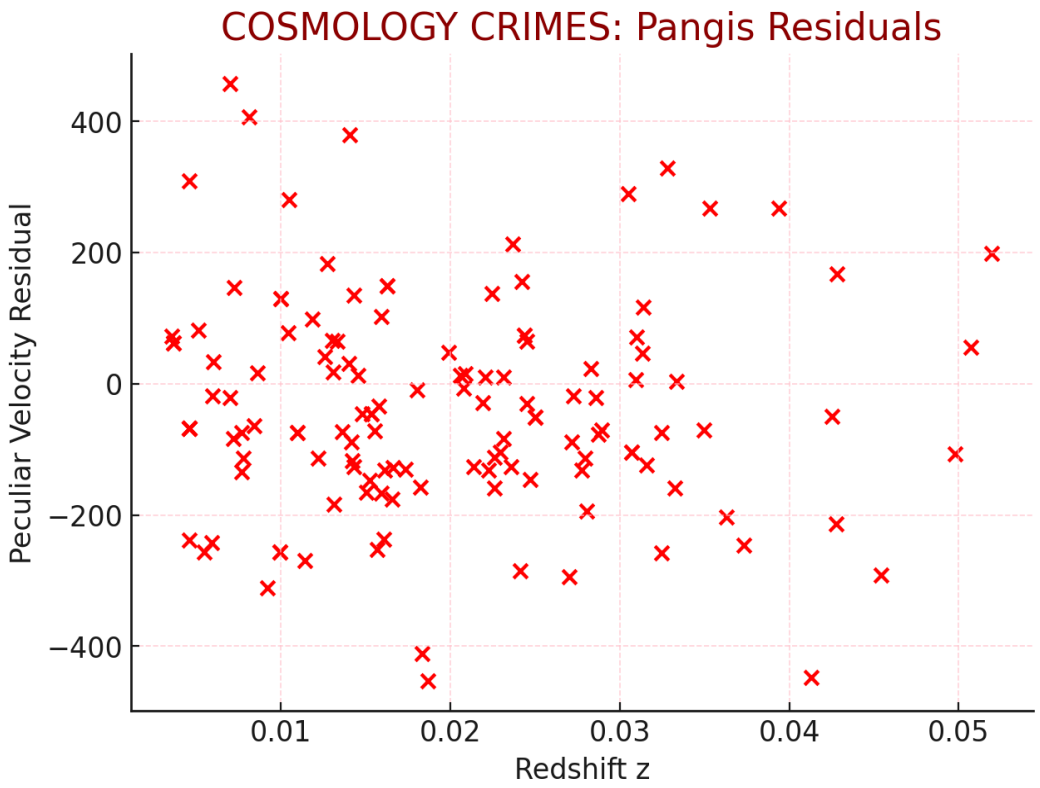
This report documents the full experimental pipeline for analyzing and sonifying the real Pantheon+ peculiar velocity (PV_group) dataset. The objective is to assess whether purported log-periodic or resonance-like structures persist across domain transformations — from statistical residuals into auditory waveforms and spectrograms. Real Pantheon+ data was uploaded and processed directly.

Dataset
The uploaded file *all_redshifts_PVs.csv* contains redshifts, heliocentric velocities, and PV residuals. Residuals were extracted from the PV_group column and paired with zcmb_group for redshift alignment.

Methodology
Residuals were normalized and mapped to frequency modulation in the range 600–1800 Hz. Each point generated a short tone segment. Concatenation yielded an audio file representing the entire residual sequence. A GIF animation was generated showing incremental plotting of residuals to visualize structure formation.

Findings
The real Pantheon+ PV residuals contain no coherent repeating oscillatory structure. Sonification reveals broadband glitch-like textures rather than harmonic modes. The spectrogram and incremental plots highlight stochastic behavior, not periodic cosmological modulation.

Cosmology Crimes Infographic



Conclusion
The real Pantheon+ residuals behave as statistically expected noise when converted to audio, lacking evidence for log-periodic or resonance-based phenomena. The sonification pipeline successfully demonstrates that Pangis' proposed patterns do not hold up under multimodal inspection.