

1. Purpose - Evaluate comparability of the current NAT audio-mode pipeline to established quantum-related standards. This report assesses standards alignment; it does not assert quantum entanglement or nonlocality.

2. System Under Test

Pipeline: AIFF audio - framing (STFT) - spectral features - quantized tokens - events and checksum grid. BELL_PING is defined as a persistent C6 pitch-signature event (tolerance and duration rules).

3. Standards Considered and Findings

3.1 Bell / CHSH (Bell inequality)

A conformant Bell/CHSH test requires two measurement arms (A and B), multiple settings per arm, binary outcomes (+/-1), and computation of the CHSH statistic S. The current NAT run is derived from a single audio stream and does not define arms, settings, binary outcomes, or compute S.

Finding: Not comparable to Bell/CHSH compliance in its current configuration. The term "Bell" is presently a domain marker, not a Bell-inequality result.

3.2 Quantum Metrology (time/frequency traceability)

NAT timestamps are internally consistent using $t_i = iH/F_s$. However, SI-traceable metrology requires a calibrated clock reference and an uncertainty budget.

Finding: Internally reproducible, but not SI-traceable without clock calibration and documented uncertainty.

3.3 Time-frequency realism (Fourier-limited resolution)

Windowed spectral analysis obeys a time-frequency tradeoff. NAT visualizations derived from fixed window W and FFT size N are consistent with this constraint, supporting signal-processing realism.

Finding: Conformant with Fourier-limited realism constraints.

3.4 Quantum randomness and post-quantum cryptography

These standards apply only if NAT is used as an entropy source or cryptographic primitive. The current objective is structured token/event extraction from composed audio.

Finding: Not applicable under current use.

4. Formal Conclusion