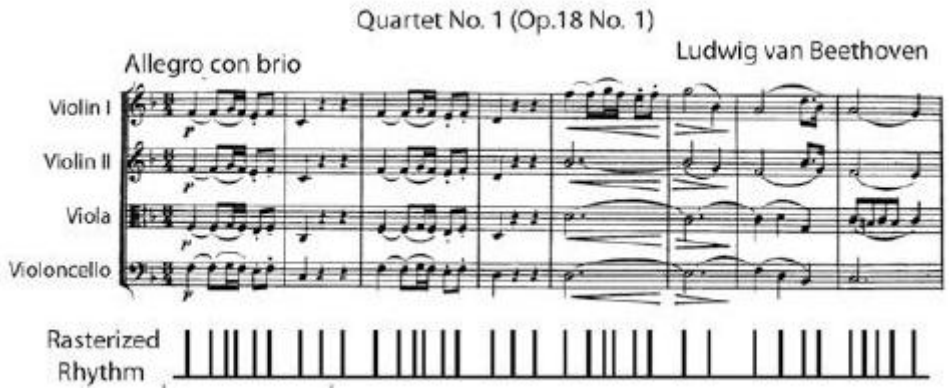
Tempo/Beat (Phase) Fluctuations in Music:

Analyzing the tempo/beat of human music for evidence of $1/f^{\beta}$ fluctuations is more difficult to achieve, however very recently an incredibly nice paper was published on this subject: "Musical Rhythm Spectra from Bach to Joplin Obey a $1/f$ Power Law", D.J. Levitin, P. Chordia, V. Menon, Proc. Nat. Acad. Sci. **109** (10) *p*. 3716-3720 (2012). The tempo/beat/rhythmic aspects of statistically large samples of human music were analyzed using the onset of notes from {digitized} sheet music {in Humdrum kern data format files, see *e.g*. Kern Scores http://kern.humdrum.org/}, rasterizing the rhythm as shown in the figure below:



The authors analyzed fluctuations in the tempo/rhythm of music written by several different composers, and for many different musical genres. As shown in the figures below, the authors discovered significant variation in the values of the exponent $\sim 0.5 \lesssim \beta \lesssim \sim 1.1$ for tempo/rhythm moment-to-moment fluctuations, whereas amplitude / loudness and/or frequency/pitch moment-to-moment fluctuations in human music have considerably less variation, being centered close to $\beta \sim 1.0$.