

The actual beat pattern is in fact even more complicated than that shown above, due to the fact(s) that a.) the rotating vibrating rod is a spatially extended sound source, b.) the listener/observer is a finite distance from the vibrating rod, and c.) the acoustic environment also affects the overall sound. Sounds emanating from the ends of the rod are reflected off of walls, which the listener also hears, in addition to the sound waves coming directly from the two ends of the rotating vibrating rod.

Thus, we can see that quite a wide variety of acoustical phenomena can be observed associated with the longitudinal vibrations of a simple metal rod!

Musically, it is conceivable that an entire marching band could play a musical piece where each marching band member twirled their own vibrating aluminum rod of a given length, tuned to a given frequency. As we have discussed, twirling such vibrating rods like batons gives them an additional, rich sound texture due to the Doppler effect. A marching band playing a musical piece with twirling vibrating aluminum rods of varying lengths would make for a very unique half-time show e.g. at the Rose Bowl!

Would Mandi Patrick, UIUC Feature Twirler, be willing to lead such a marching band???



Also, if interested, check out e.g. **Tom Kaufmann** (musician and instrument builder) playing a “friction harp” – a whole collection of longitudinally-vibrating rods on YouTube:

<http://www.youtube.com/watch?v=47wkiyLsc2U> and: <http://www.youtube.com/watch?v=g4i2mzQqNRY>

Check out the “Earth Harp(s)” on YouTube: http://www.youtube.com/watch?v=xM1O5z_RAC8