# The Geometry of Music

Dmitri Tymoszko
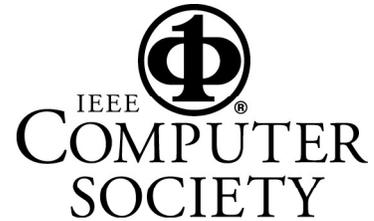
This talk will show how to use *orbifolds* to model the way listeners, composers, and performers abstract away from musical information.

The understanding of music involves ignoring, or abstracting away from, certain information. For example, we understand the violinist's middle C and the vocalist's middle C to be two instances of the same pitch, ignoring the differences in tone quality (timbre) and pitch variation (vibrato). If we were not able to ignore non-essential information, we would be trapped in a sea of unrelated particulars, unable to hear the general patterns that make music meaningful.

Orbifolds are a way to give a simple mathematical explanation of certain musical ideas. Orbifolds are geometrical quotient spaces formed when we identify or "glue together" points in a parent space. Orbifolds were first discussed in the 1950s, and play an important role in string theory. One example orbifold in music: the set of two-note chords. This set is a geometric space which is a Mobius strip whose boundary is a mirror. Analogous spaces exist in higher dimensions, containing chords with more notes. These spaces provide fundamentally new representations of musical structure, representations that are intrinsically beautiful and have a wide range of potential applications.

Dmitri Tymoczko is a composer and music theorist who is a member of the Music Composition faculty at Princeton University. He studied music and philosophy at Harvard, and in 1992 received a Rhodes Scholarship to do graduate work in philosophy at Oxford. In 2002, he received a Ph.D. in music composition from the University of California, Berkeley, and he was a 2005-6 Radcliffe Institute fellow. Dmitri's music has won numerous prizes and awards, and has been performed by the Brentano Quartet, the Pacifica Quartet, the Network for New Music, the Synergy Vocal Ensemble, and others. His recent article "The Geometry of Musical Chords" was the first music theory article published by Science in its 127-year history.

Date: Thursday, April 19, 2007, 8:00 pm.
               (Refreshments and networking at 7:30 pm.)
Place: Sarnoff Corp., Routes 1 and 571, Princeton, NJ
Information: Rebecca Mercuri (609) 587-1886, Dennis Mancl (908) 582-7086
On-line info: **http://www.acm.org/chapters/princetonacm**
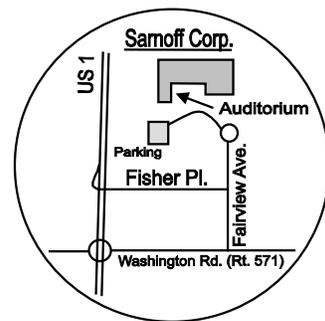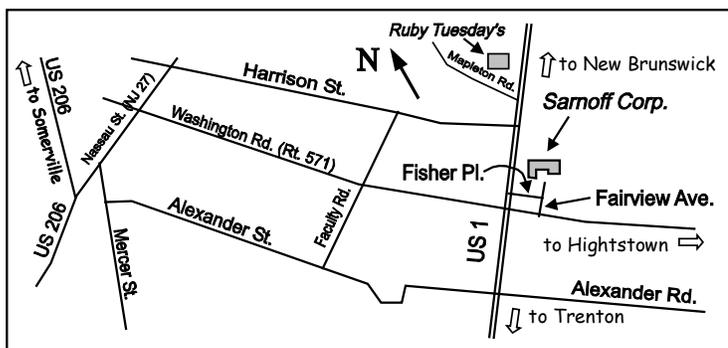
All ACM / IEEE-CS meetings are open to the public. Students and their parents are welcome. There is no admission charge, and refreshments are served.

A pre-meeting dinner with the speaker is held at 6:00 p.m. at Ruby Tuesday's Restaurant on Route 1. Please send email to **princetonacm@acm.org** in advance if you plan to attend the dinner.