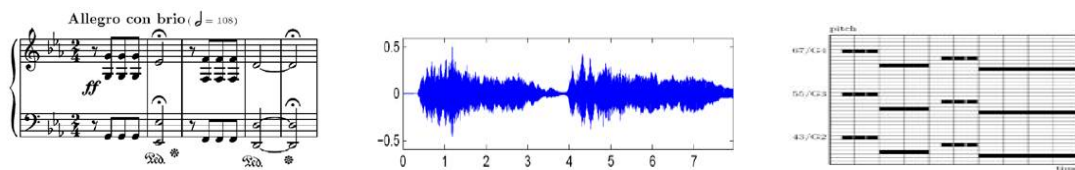


# Music Processing

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## 1 Organization

- Summer Term 2010, Thu. 16-18, Building E 1.4 (MPI), Room 24
- First Lecture: Thu. 15.04.2010
- 3 Credit Points
- [http://www.mpi-inf.mpg.de/departments/d4/teaching/ss2010/mp\\_mm/](http://www.mpi-inf.mpg.de/departments/d4/teaching/ss2010/mp_mm/)
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- Contact: Peter Grosche, `pgrosche@mpi-inf.mpg.de`
- Contact: Verena Konz, `vkonz@mpi-inf.mpg.de`

## 2 Content

Significant digitization efforts have resulted in large multimodal music collections, which comprise music-related documents of various types and formats including text, symbolic data, audio, image, and video. The challenge is to organize, understand, and search multimodal musical content in a robust, efficient and intelligent manner. Key issues concern the development of methods for analyzing, correlating, and annotating the available multimodal material, thus identifying and establishing semantic relationships across various music representations and formats. Here, one important task is referred to as music synchronization, which aims at identifying and linking semantically corresponding events present in different versions of the same underlying musical work.

In this course, we study fundamental algorithms and concepts for the analysis and retrieval of music data. Important aspects concern the design of suitable features, the notion of similarity used to compare time-dependent data streams, as well as data organization. One general goal of this lecture is to highlight the interplay between modeling, experimentation, and mathematical theory as well as to give some insights into active research fields.

### 3 Course requirements

In this course, we discuss a number of current research problems in music processing or music information retrieval (MIR) covering aspects from information science and digital signal processing. We provide the necessary background information and give numerous motivating examples so that no specialized knowledge is required. However, the students should have a solid mathematical background. The lecture is accompanied by readings from textbooks or the research literature. Furthermore, the students are encouraged to experiment with the presented algorithms using MATLAB.

### 4 Course material

- Textbook:  
Meinard Müller  
Information Retrieval for Music and Motion  
Springer, 2007
- Course slides
- MATLAB source code
- Further material will be announced and issued later



### 5 Examinations

Probably oral examinations (depending on the number of students) at the end of the semester. Tentative dates:

- Monday, 19.07.2010, 12-19, Campus E1.4 (MPI), Rotunda (second floor)
- Thursday, 22.07.2010, 12-19, Campus E1.4 (MPI), Rotunda (second floor)

### 6 Tentative Schedule

1. **(15.04.):** Overview
2. **(22.04.):** Music Representations (Score, Audio, MIDI) [Section 2.1]
3. **(29.04.):** Fourier Transform [Section 2.2]
4. **(06.05.):** Fourier Transform
- **(13.05.):** Christi Himmelfahrt
5. **(20.05.):** Features (Pitch, Chroma, CENS, MFCC) [Chapter 3]
6. **(27.05.):** Dynamic Time Warping (DTW) [Chapter 4]
- **(03.06.):** Fronleichnam
7. **(10.06.):** Music Synchronization [Chapter 5]
8. **(17.06.):** Music Analysis Tasks and Applications (Performance Analysis, Structure Analysis)
9. **(24.06.):** Tempo and Beat Analysis (Peter Grosche)
10. **(01.07.):** Audio Identification, Fingerprinting, and Audio Matching
11. **(08.07.):** Chord Analysis (Verena Konz)
12. **(15.07.):** Wrap-up and Summary
- **(19.07.):** Examinations
- **(22.07.):** Examinations