

Lecture

Music Processing Analysis (MPA)

Introduction

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Meinard Müller



- Mathematics (Diplom/Master)
Computer Science (PhD)
Information Retrieval (Habilitation)

Bonn University



- Combinatorics (Postdoc)

Keio University, Japan



- Senior Researcher

Max-Planck Institute, Saarland



- Professor: Semantic Audio Processing

Erlangen-Nürnberg University



Group Members

- Christof Weiß
- Frank Zalkow
- Michael Krause
- Sebastian Rosenzweig
- Hendrik Schreiber



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Where are we?

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Fraunhofer-Gesellschaft

- Europe's largest organization for applied research
- 18,000 employees worldwide, total budget: 1.5 billion €
- 60 institutes covering a broad range of research areas

Fraunhofer Institute for Integrated Circuits IIS

- Largest Fraunhofer institute
- Staff >700 people
- MP3



Where are we?



Friedrich-Alexander Universität Erlangen-Nürnberg (FAU)

- One of Germany's largest universities
- More than 35,000 students



Collaboration between FAU and Fraunhofer IIS

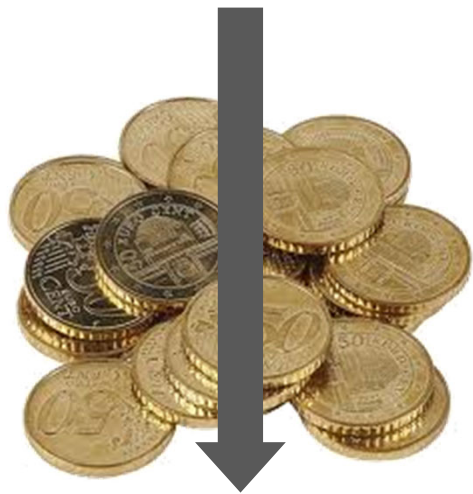
- Roots of “MP3” audio compression scheme
- Research on audio coding in Erlangen since 1981

International Audio Laboratories Erlangen

 **Fraunhofer**
IIS




FAU FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG



AUDIO
LABS

International Audio Laboratories Erlangen



Audio

International Audio Laboratories Erlangen

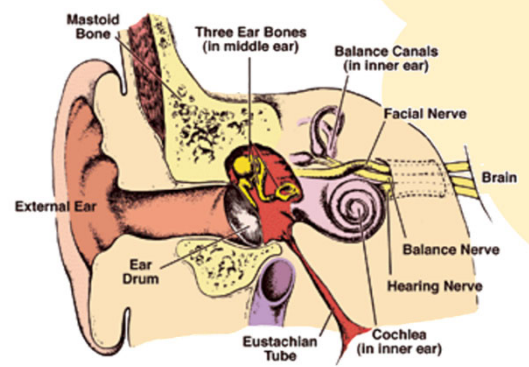
Audio Coding



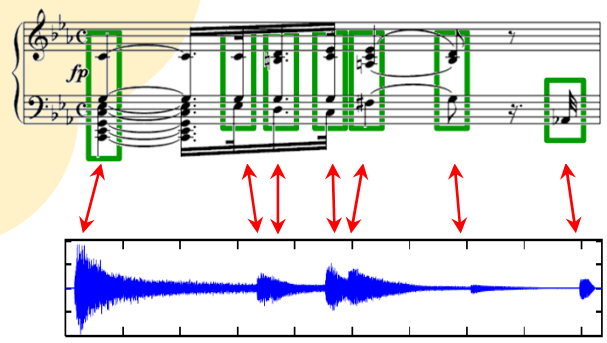
3D Audio



Audio



Psychoacoustics



Music Processing

AudioLabs – FAU

- Prof. Dr. Jürgen Herre
Audio Coding
- Prof. Dr. Bernd Edler
Audio Signal Analysis
- Prof. Dr. Meinard Müller
Semantic Audio Processing
- Prof. Dr. Emanuël Habetts
Spatial Audio Signal Processing
- Prof. Dr. Frank Wefers
Virtual Reality
- Dr. Stefan Turowski
Coordinator AudioLabs-FAU



Related Courses

Audio Processing **Laboratory**

The objective of this lab course is to give students a hands on experience in audio processing.

- Offered every semester
- Short-Time Fourier Transform
- Speech Enhancement
- Statistical Methods
- Speech Analysis
- ...

Registration via StudOn is mandatory!

Audio Processing **Seminar**

Various applications within audio and acoustic signal processing.

- Offered every semester
- Advanced topics
- Require lecture on DSP, audio, ...
- Also music-related topics
- ...

Registration via StudOn is mandatory!



Registration on studOn is mandatory!

Related Courses

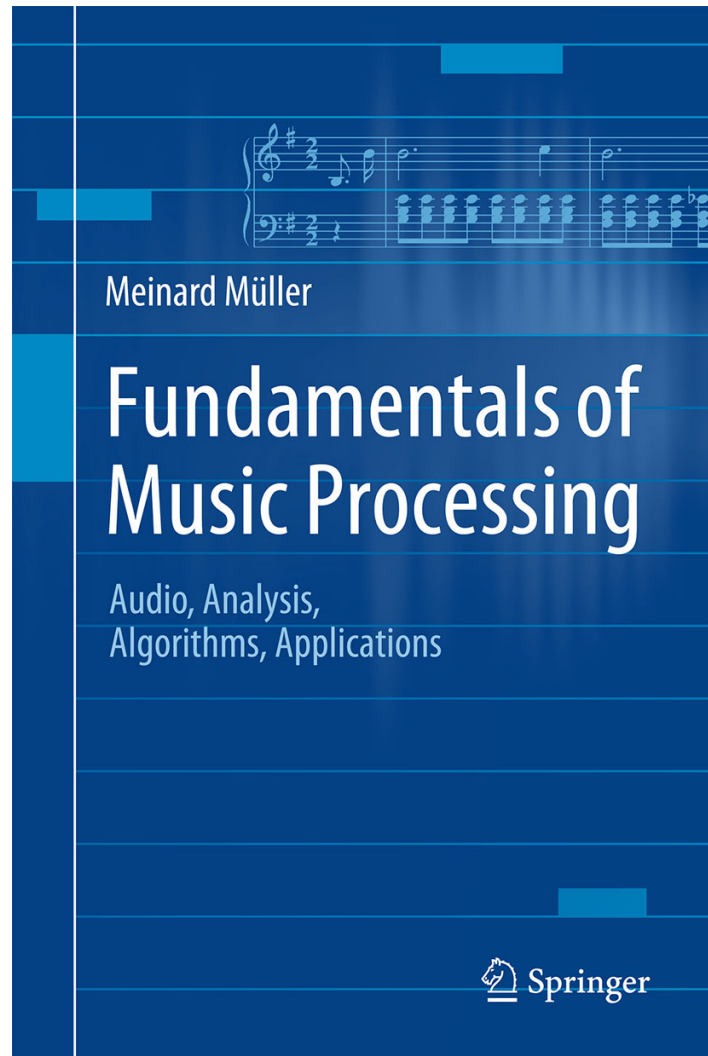
- **Speech Enhancement**
Prof. Dr. Emanuël Habets
AudioLabs
- **Advanced Topics in Perceptual Audio Coding**
Prof. Dr. Jürgen Herre
AudioLabs
- **Music Processing – Synthesis**
Maximilian Schäfer (Prof. Dr.-Ing. Rudolf Rabenstein)
Lehrstuhl für Digitale Übertragung (LMS)

Lecture: Music Processing Analysis (MPA)

https://www.audiolabs-erlangen.de/fau/professor/mueller/teaching/2019w_mpa

- Dates, Material, Information ... → **See website!**
- Time: Mo 16-18
- Mandatory elective course for CME, I&K, EEI, and ASC
Credits: 2,5 ECTS
- Vertiefungsmodul Informatik (Master of Science)
Medieninformatik, Mustererkennung
Credits: 5 ECTS (Lecture & Exercise, MPA-LE)
Time (Exercise): Mo 14-16
- Oral exam

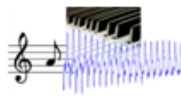

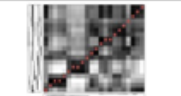
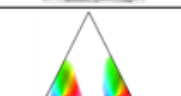

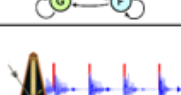


Book: Fundamentals of Music Processing



Meinard Müller
Fundamentals of Music Processing
Audio, Analysis, Algorithms, Applications
483 p., 249 illus., hardcover
ISBN: 978-3-319-21944-8
Springer, 2015

Accompanying website:
www.music-processing.de

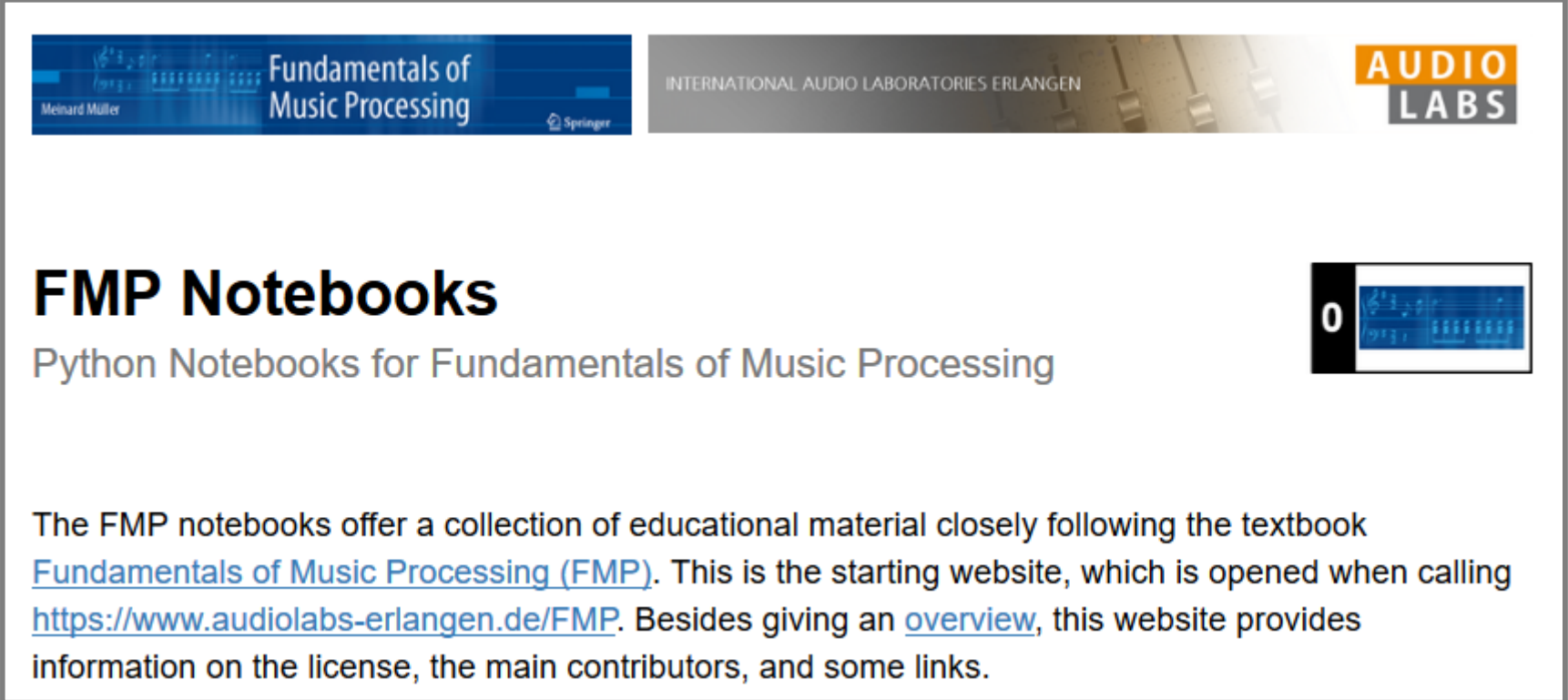
Book: Fundamentals of Music Processing

Chapter		Music Processing Scenario
1		Music Representations
2		Fourier Analysis of Signals
3		Music Synchronization
4		Music Structure Analysis
5		Chord Recognition
6		Tempo and Beat Tracking
7		Content-Based Audio Retrieval
8		Musically Informed Audio Decomposition

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Software & Audio: FMP Notebooks



The screenshot shows the header of the FMP Notebooks website. On the left is the cover of the book 'Fundamentals of Music Processing' by Meinard Müller, published by Springer. In the center is the text 'INTERNATIONAL AUDIO LABORATORIES ERLANGEN'. On the right is the 'AUDIO LABS' logo. Below the header, the title 'FMP Notebooks' is displayed in a large, bold font, followed by the subtitle 'Python Notebooks for Fundamentals of Music Processing'. To the right of the subtitle is a small icon of a notebook with a musical staff and a large number '0'. Below this, a paragraph of text describes the notebooks as educational material following the textbook 'Fundamentals of Music Processing (FMP)', providing an overview and links to the website, license, and contributors.

FMP Notebooks

Python Notebooks for Fundamentals of Music Processing

The FMP notebooks offer a collection of educational material closely following the textbook [Fundamentals of Music Processing \(FMP\)](#). This is the starting website, which is opened when calling <https://www.audiolabs-erlangen.de/FMP>. Besides giving an [overview](#), this website provides information on the license, the main contributors, and some links.

<https://www.audiolabs-erlangen.de/FMP>