



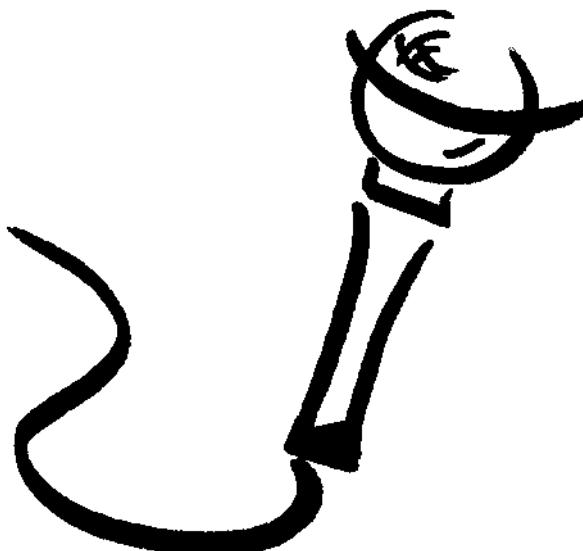
# Numerische Mathematik

## *Fourieranalyse*



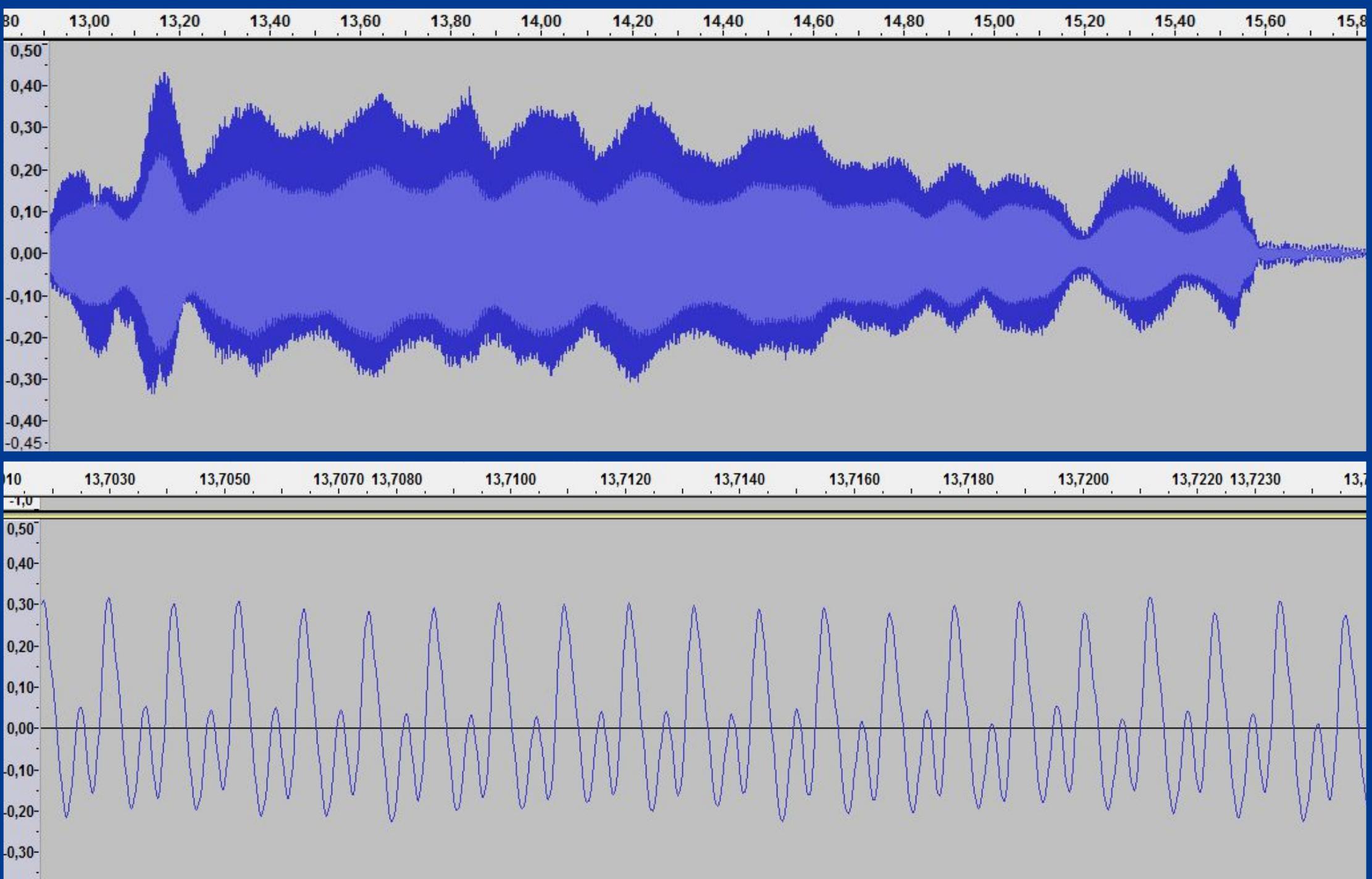
# Musik & Mathematik

- ▶ Musik = schwingende Luft
- ▶ übers Mikro → Computer: z.B. Audacity



Audacity®

# Zeitbereich

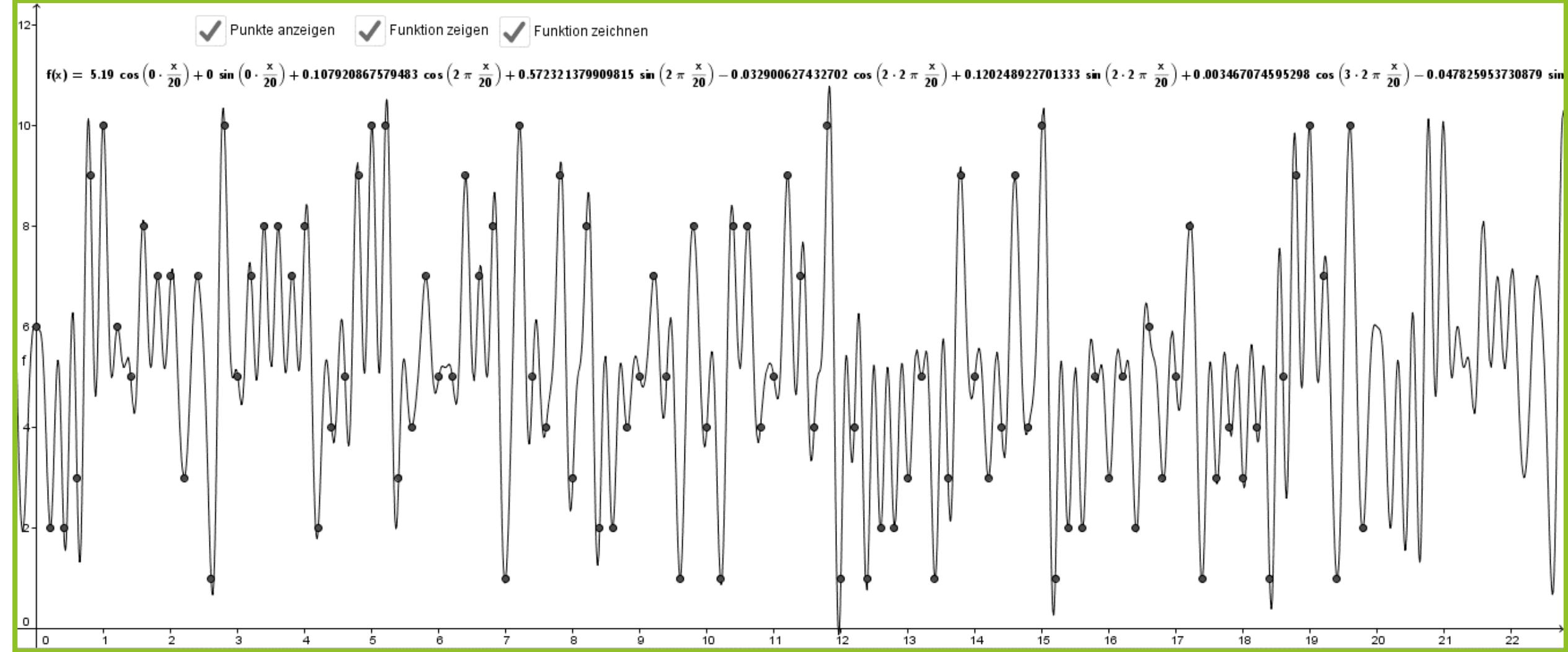


# Fourieranalyse

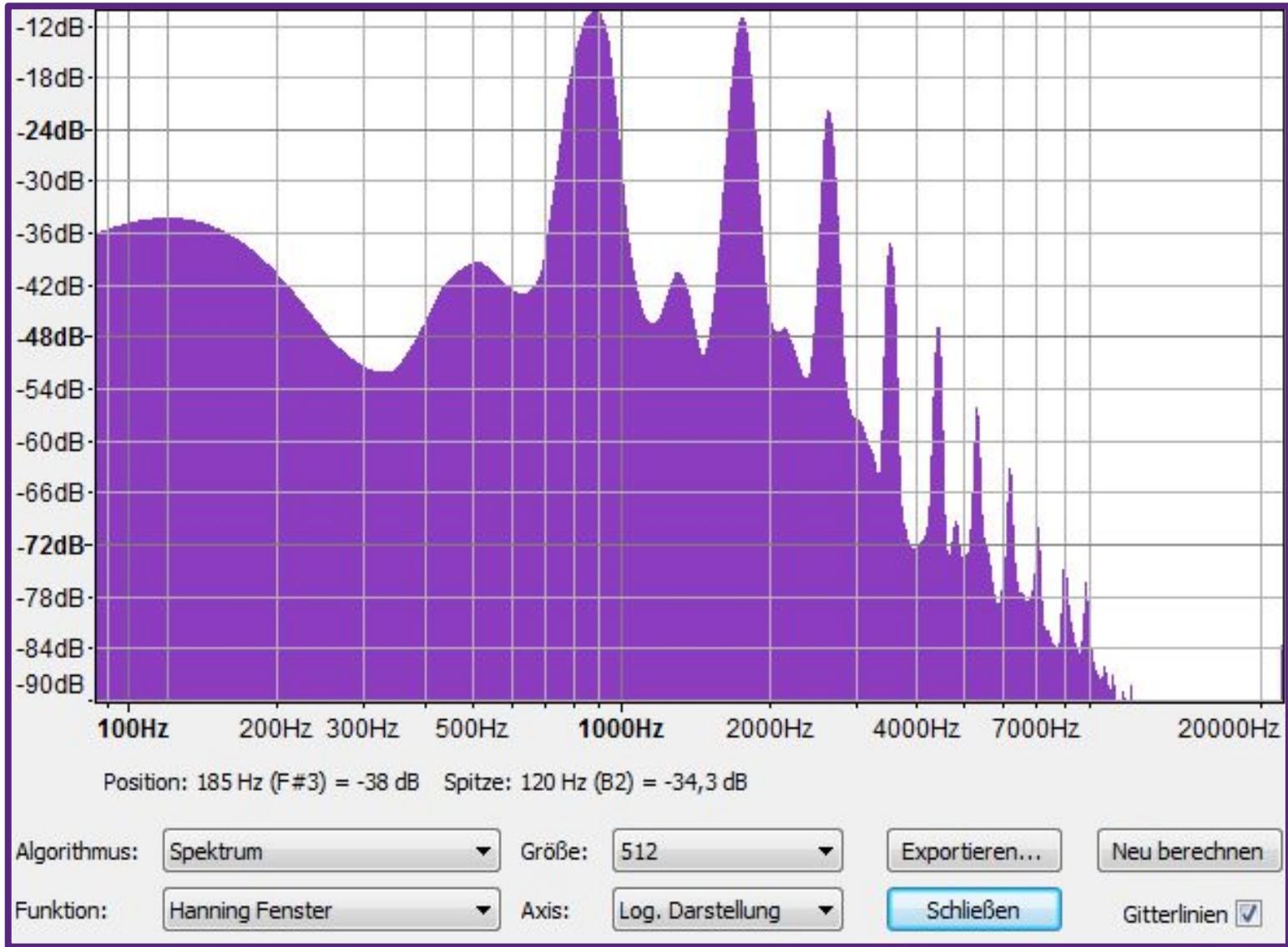
- ▶  $a = 10^{\frac{dB}{20} + 2}$
- ▶  $f(x) = \sum_{k=0}^{n-1} [a_k \cdot \cos(k 2\pi x) + b_k \cdot \sin(k 2\pi x)]$
- ▶  $a_k = \frac{1}{n+1} \cdot \sum_{i=0}^{n-1} [g(t_i) \cdot \cos(k 2\pi t_i)]$
- ▶  $b_k = \frac{1}{n+1} \cdot \sum_{i=0}^{n-1} [g(t_i) \cdot \sin(k 2\pi t_i)]$

Punkte anzeigen Funktion zeigen Funktion zeichnen

$$f(x) = 5.19 \cos\left(0 \cdot \frac{x}{20}\right) + 0 \sin\left(0 \cdot \frac{x}{20}\right) + 0.107920867579483 \cos\left(2 \pi \frac{x}{20}\right) + 0.572321379909815 \sin\left(2 \pi \frac{x}{20}\right) - 0.032900627432702 \cos\left(2 \cdot 2 \pi \frac{x}{20}\right) + 0.120248922701333 \sin\left(2 \cdot 2 \pi \frac{x}{20}\right) + 0.003467074595298 \cos\left(3 \cdot 2 \pi \frac{x}{20}\right) - 0.047825953730879 \sin\left(3 \cdot 2 \pi \frac{x}{20}\right)$$



# Frequenzbereich









```
Element[T, 3],  
Element[T, 3] + Element[T, 3],  
Element[T, 3] + Element[T, 3] + Element[T, 3],  
Element[T, 3] + Element[T, 3] + Element[T, 3] + Element[T, 3],  
Element[T, 3] + Element[T, 3] + Element[T, 3] + Element[T, 3] + Element[T, 3],  
Element[T, 3] + Element[T, 3],  
Element[T, 3] + Element[T, 4],  
Element[T, 3] + Element[T, 4] + Element[T, 4]
```





Danke fürs Zuhören! :)

**Peter Gangl**

Anna O., Ariane F., Armin H., Eva K., Gabriel R., Julia K., Maria L., Maureen M.,  
Sara M., Sarah T., Simon N., Viktoria H.