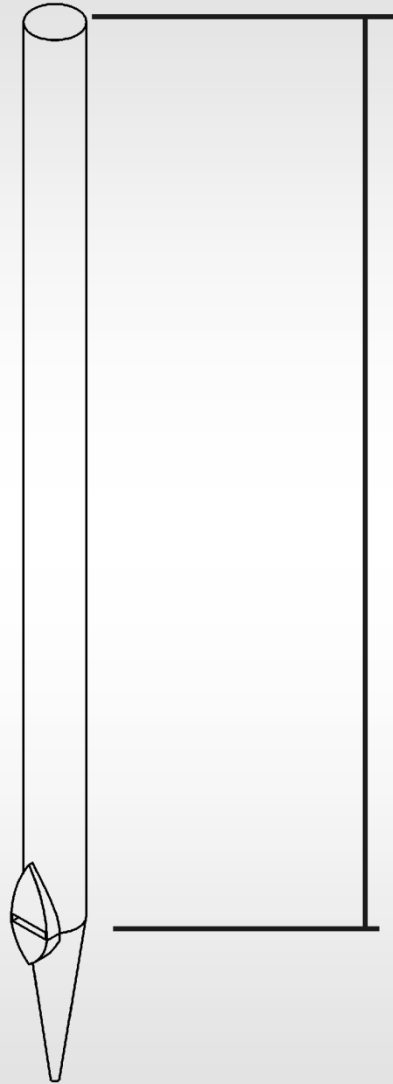


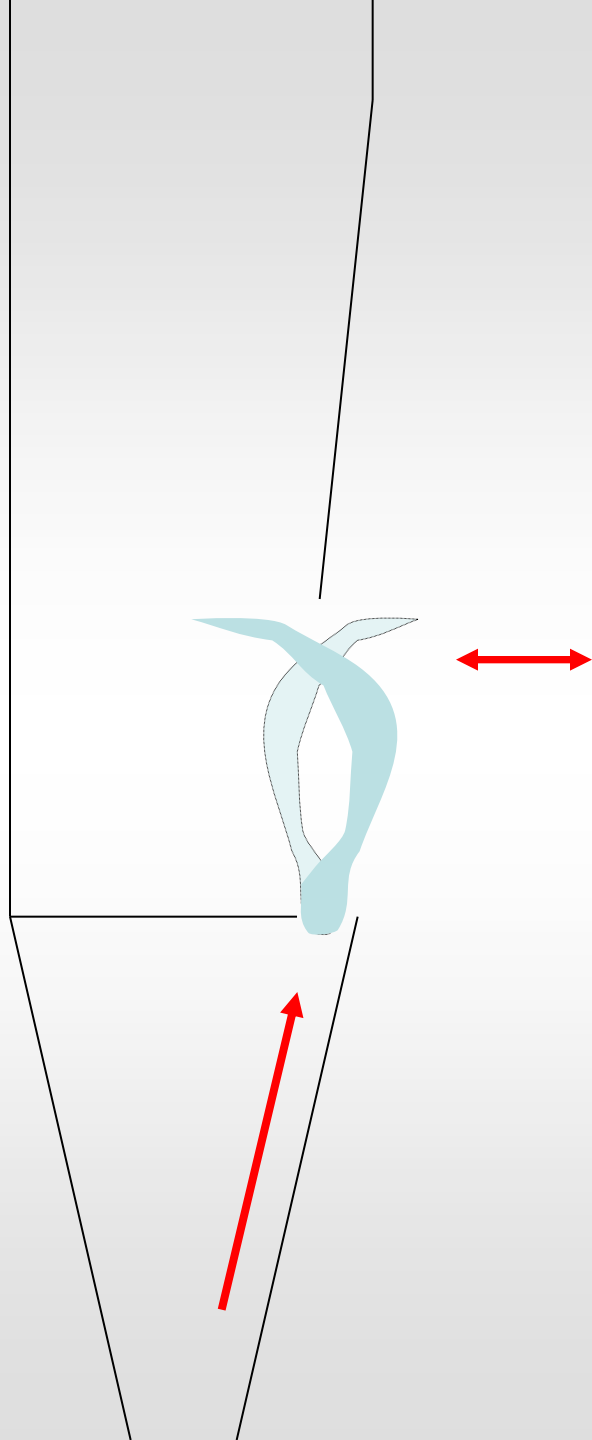
Ästhetik temperierter Stimmungssysteme

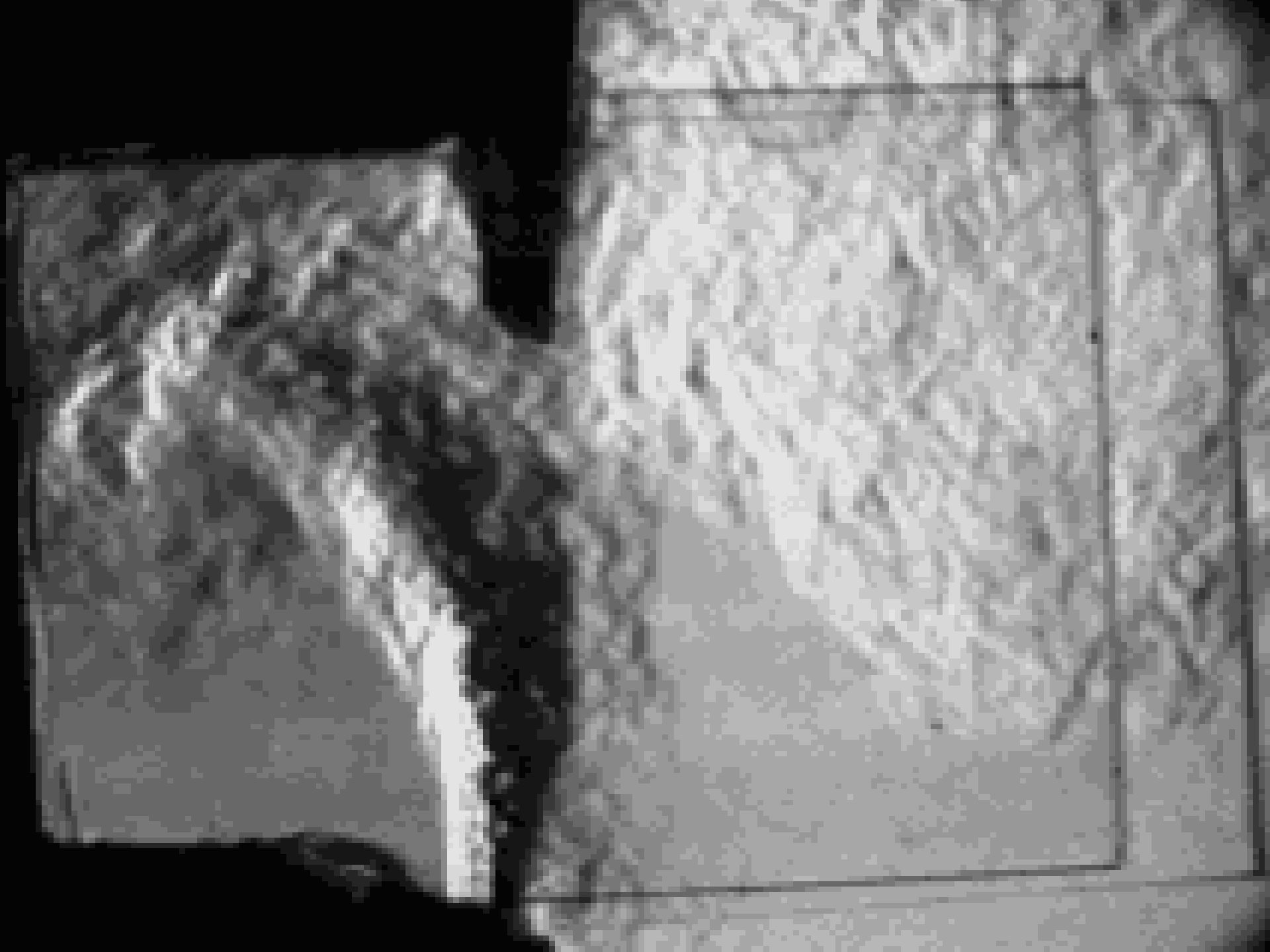
Dr. phil. Markus Voigt

- Entstehung von Stimmungssystemen
- Einstimmung des 12-teiligen Systems
- Beispiele zur Stimmungsästhetik

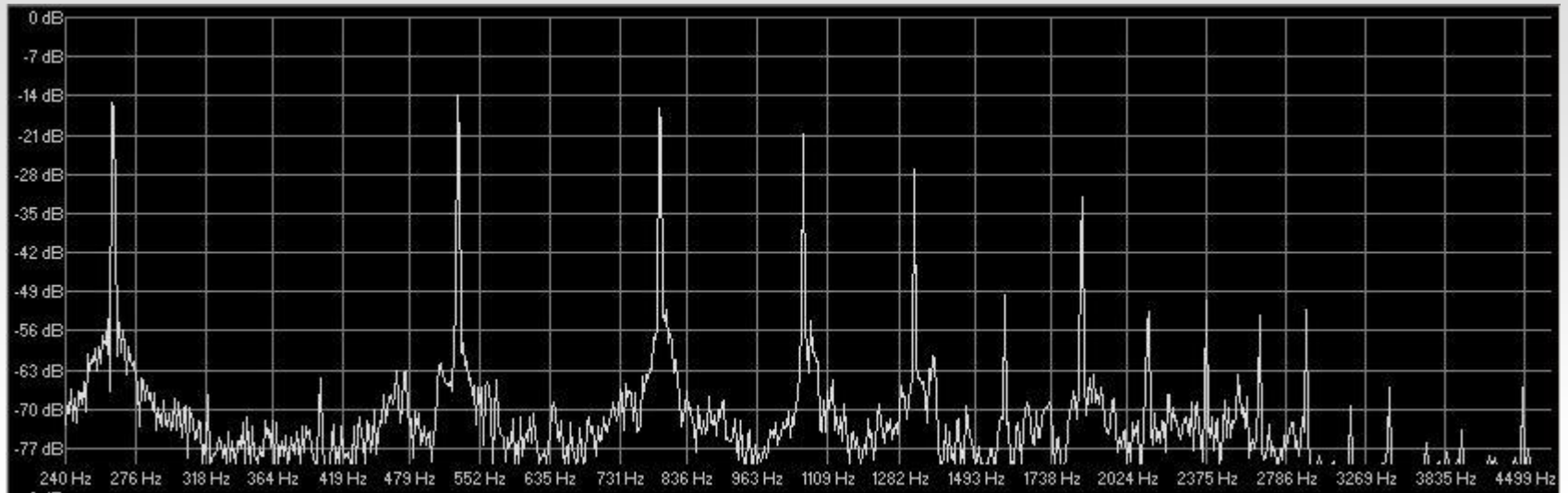
Theoretische Grundlagen des Pfeifenklanges



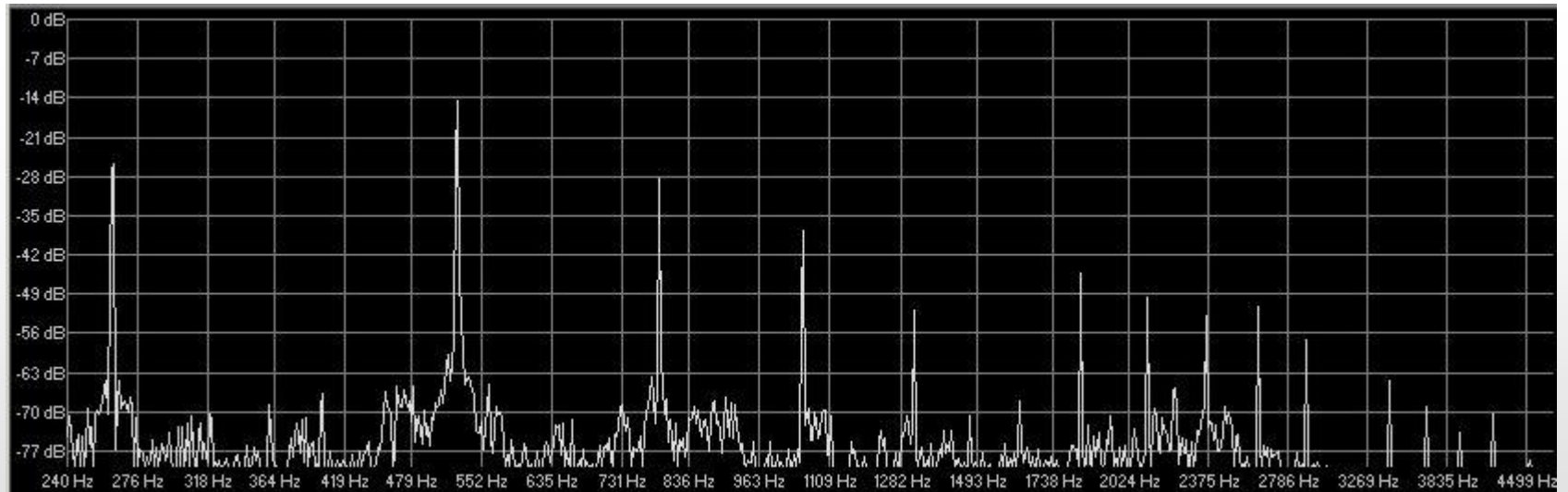




Principal 8' c°

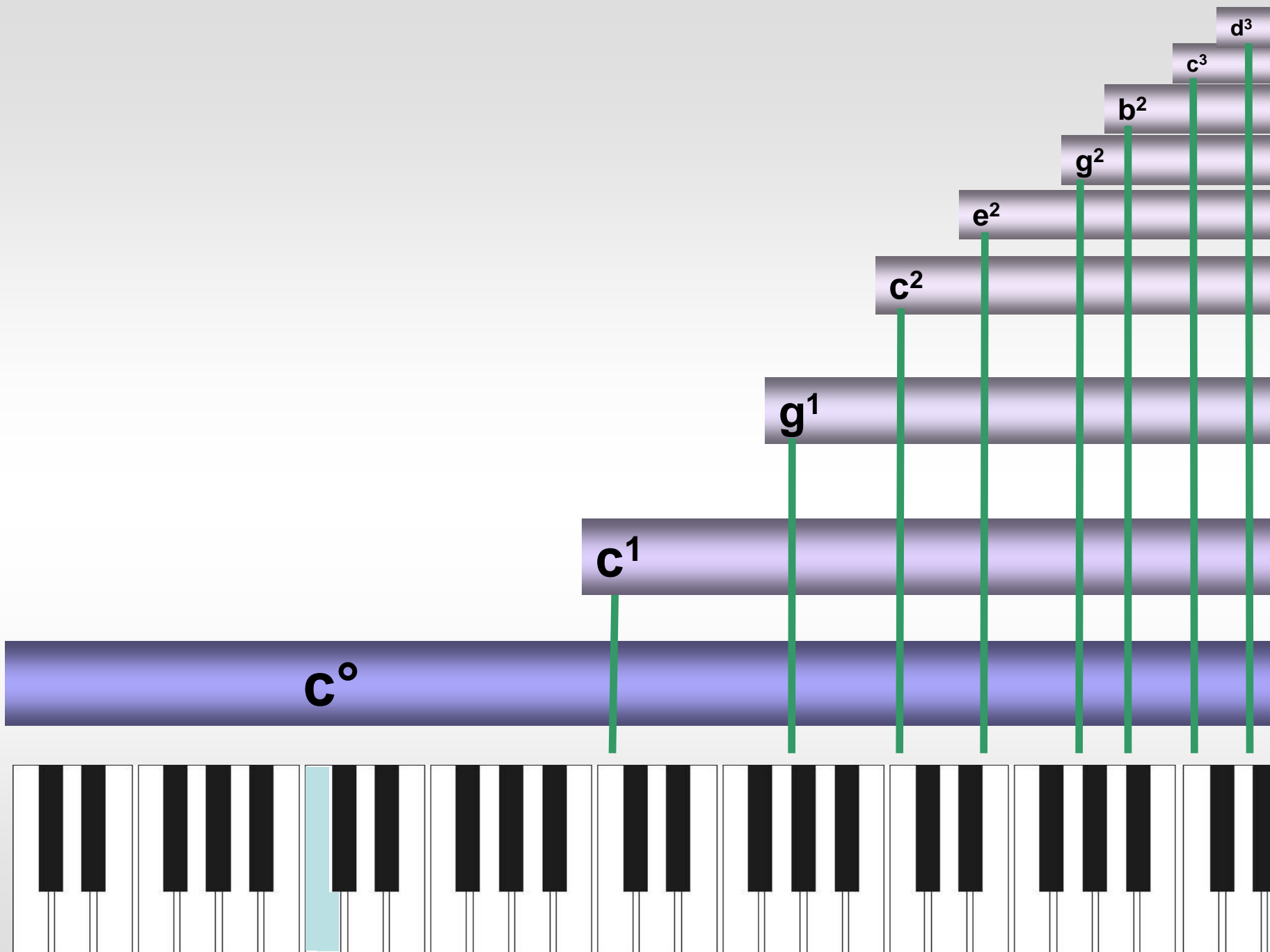


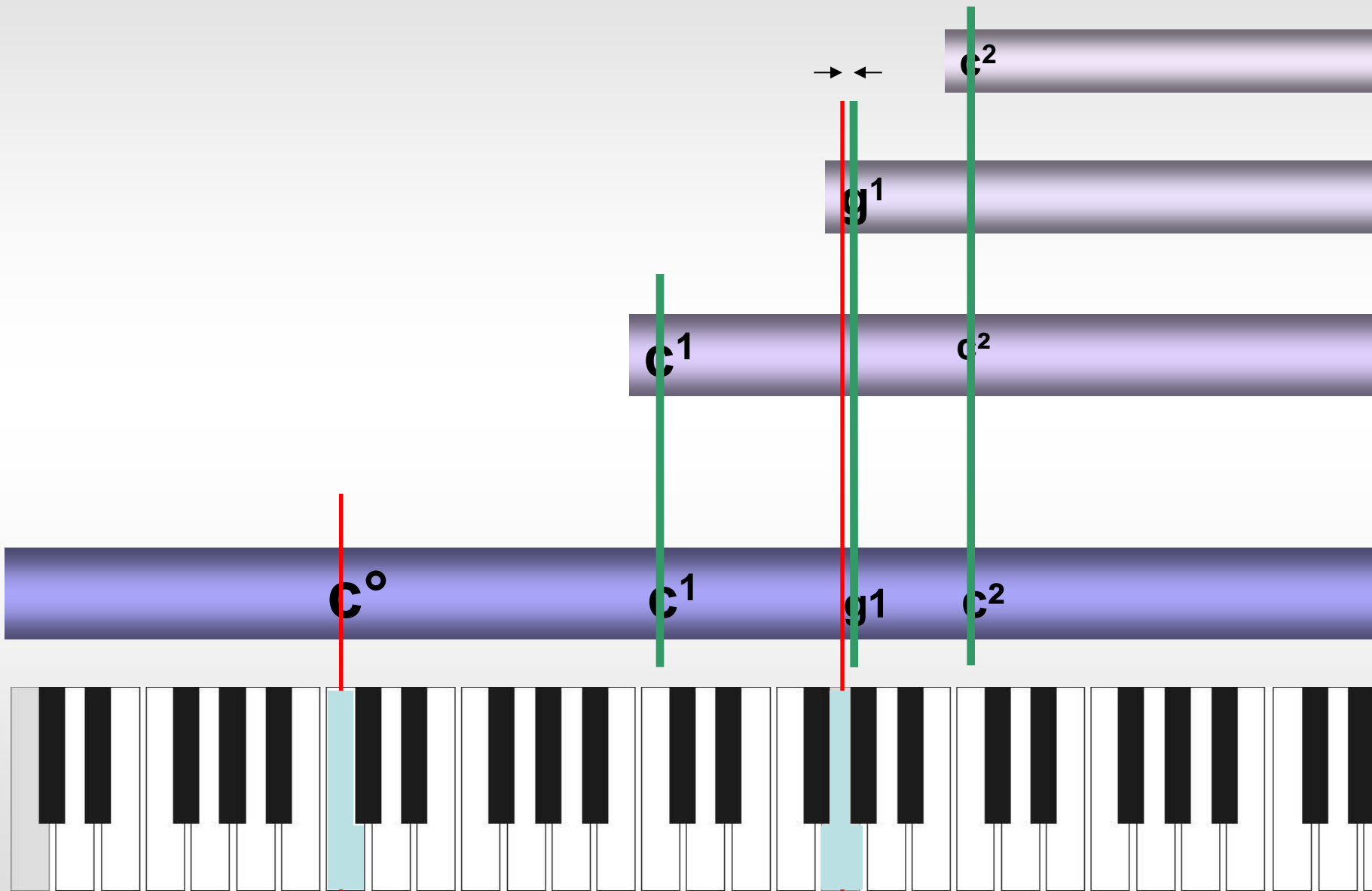
Salicional 8' c°

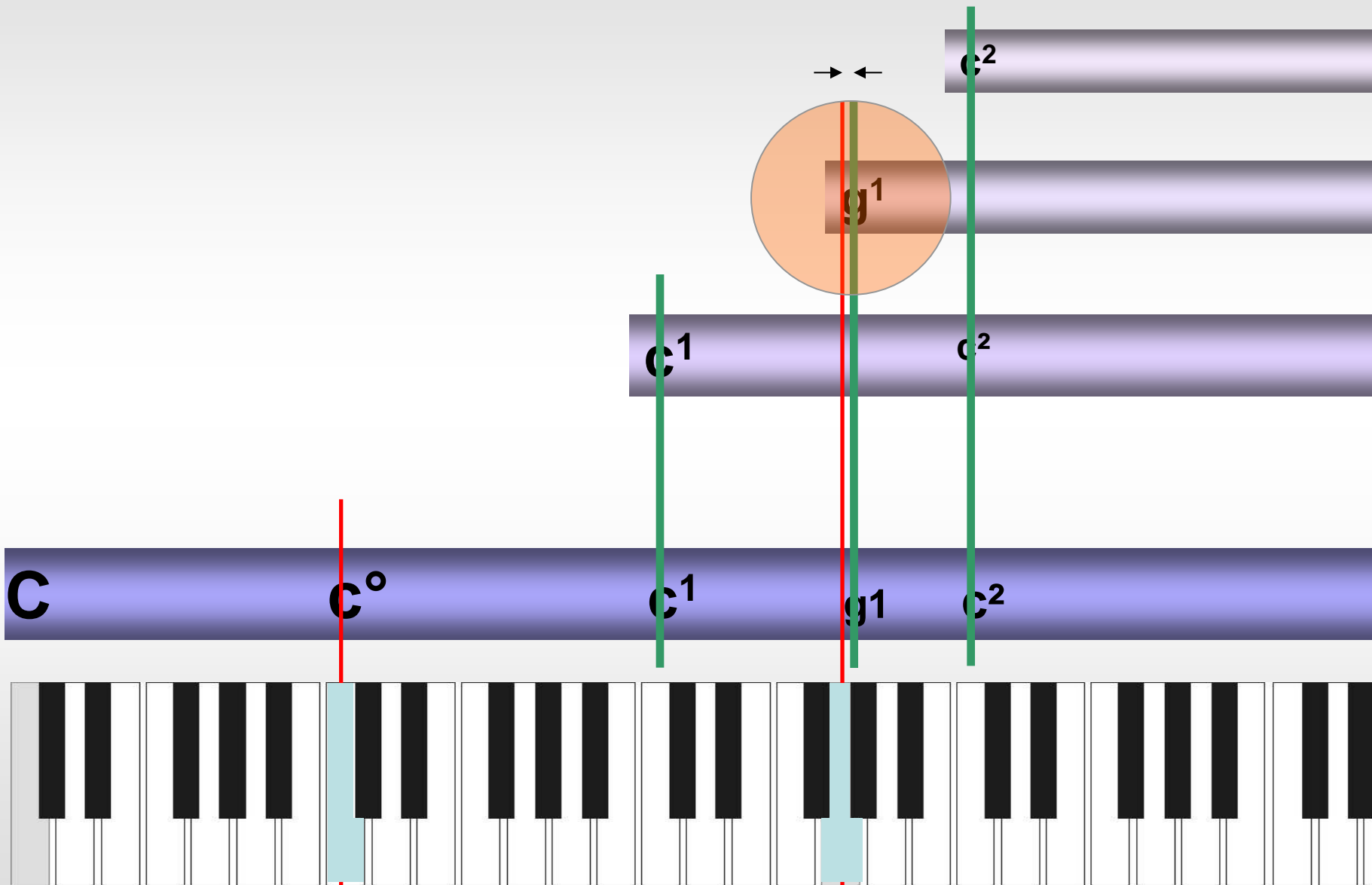


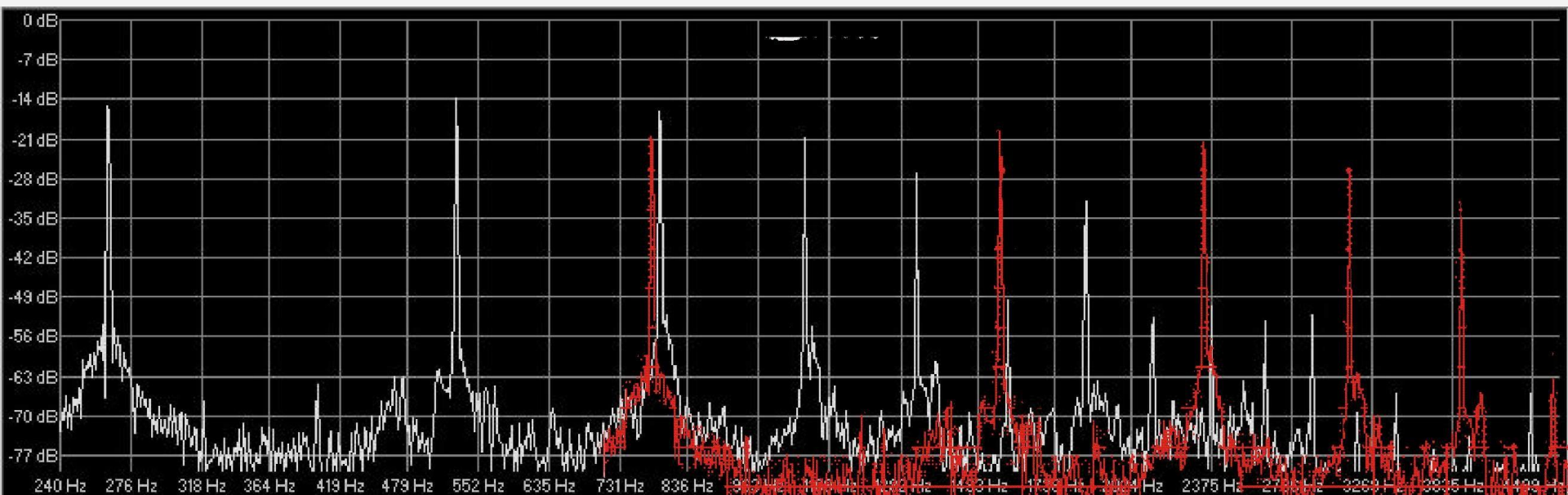
Entstehung von Ton- und Stimmungssystemen

- lassen sich derzeit bis zu 30.000 Jahre zurück nachweisen
- **quintenrein gestimmte Tonfolgen bis zur Renaissance nachweisbar**









120Hz

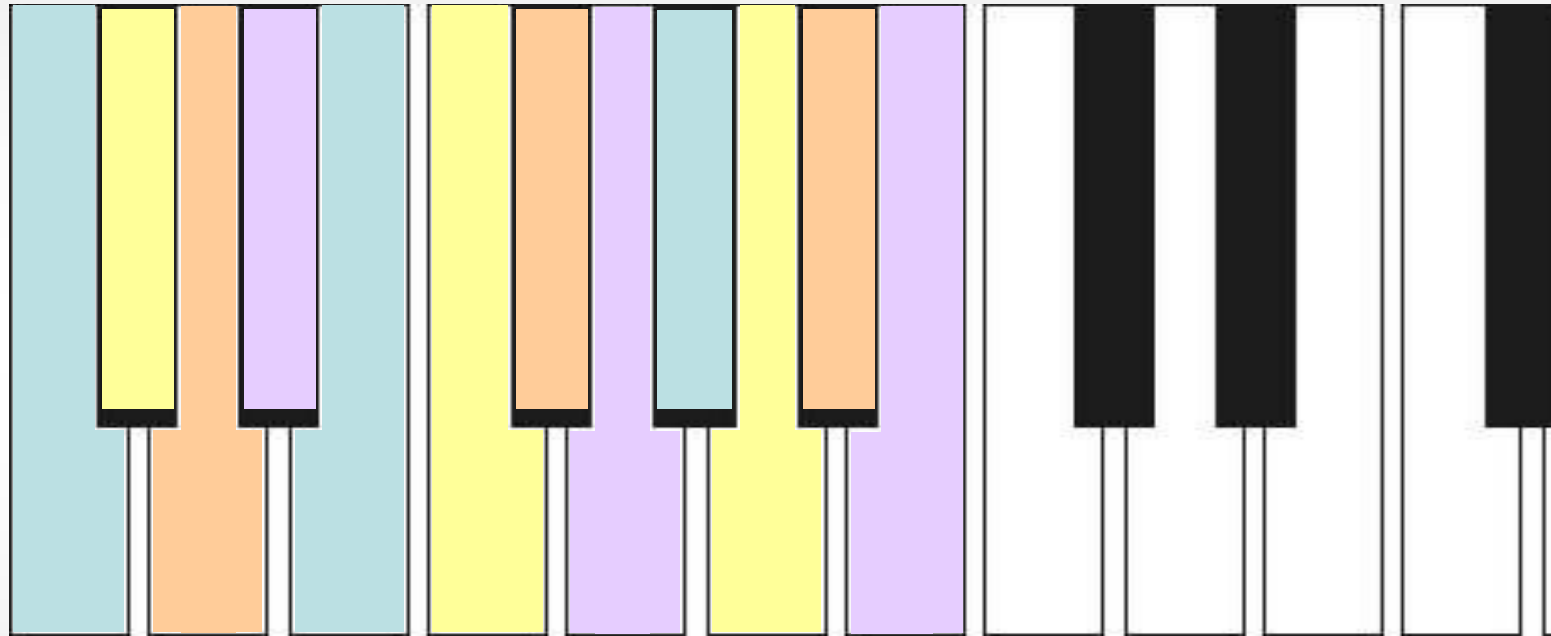
150,0Hz

180,0Hz

240Hz

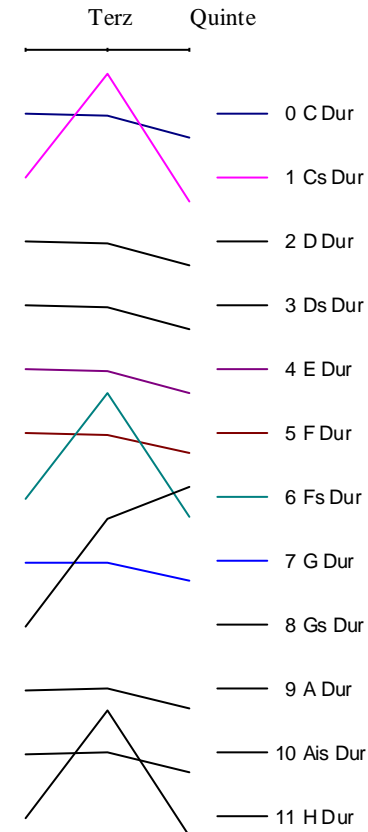
151,2Hz

179,8Hz



temperierungen.de

Stimmung		Eingabe			Differenz zur reinen		
Prätorius 1618/Sch 58		Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Terz 13,7	Quinte -2,0
Skala							
C Dur	11,0	0,0	0,0	386,0	696,0	-0,3	-6,0
Cs Dur	-13,0	-24,0	76,0	427,0	696,0	40,7	-6,0
D Dur	4,0	-7,0	193,0	386,0	696,0	-0,3	-6,0
Ds Dur	21,0	10,0	310,0	386,0	696,0	-0,3	-6,0
E Dur	-3,0	-14,0	386,0	386,0	696,0	-0,3	-6,0
F Dur	14,0	3,0	503,0	386,0	697,0	-0,3	-5,0
Fs Dur	-10,0	-21,0	579,0	427,0	697,0	40,7	-5,0
G Dur	7,0	-4,0	696,0	386,0	697,0	-0,3	-5,0
Gs Dur	-17,0	-28,0	772,0	428,0	738,0	41,7	36,0
A Dur	0,0	-11,0	889,0	387,0	697,0	0,7	-5,0
Ais Dur	17,0	6,0	1006,0	387,0	697,0	0,7	-5,0
H Dur	-7,0	-18,0	1082,0	428,0	697,0	41,7	-5,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E	-14,0 386,0	Cs - F	27,0 427,0	D - Fs	-14,0 386,0	Ds - G	-14,0 386,0
E - Gs	-14,0 386,0	F - A	-14,0 386,0	Fs - Ais	27,0 427,0	G - H	-14,0 386,0
Gs - C	28,0 428,0	A - Cs	-13,0 387,0	Ais - D	-13,0 387,0	H - Ds	28,0 428,0
Quinte		Quinte		Quinte		Quinte	
C-G	-4,0 696,0	G-D	-3,0 697,0	D-A	-4,0 696,0	A-E	-3,0 697,0
E-H	-4,0 696,0	H-Fs	-3,0 697,0	Fs-Cs	-3,0 697,0	Cs-Gs	-4,0 696,0
Gs-Ds	38,0 738,0	Ds-Ais	-4,0 696,0	Ais-F	-3,0 697,0	F-C	-3,0 697,0

Girolamo Frescobaldi

1583 – 1643

Toccata per l' Elevatione

First system of musical notation, featuring a treble and bass clef. The bass line includes the instruction *(Man.)* under the first few measures.

Second system of musical notation, featuring a treble and bass clef. The bass line includes a trill *tr* in the final measure.

Third system of musical notation, featuring a treble and bass clef. The bass line includes the instruction *(Ped.)* under the first few measures.

Fourth system of musical notation, featuring a treble and bass clef. The system includes the tempo marking *Più Adagio* above the first measure, the instruction *rit.* above the fifth measure, and trills *tr* in the final two measures.

Johann Pachelbel

1653 – 1706

Fantasia

Fantasia

J. Pachelbel

The first system of the musical score, consisting of a grand staff with a treble and bass clef. It features a complex melodic line in the treble clef and a more rhythmic accompaniment in the bass clef. A blue circle highlights a specific passage in the treble clef towards the end of the system.

The second system of the musical score. It continues the melodic and harmonic development from the first system. A blue circle highlights a passage in the treble clef, and another blue circle highlights a passage in the bass clef.

The third system of the musical score. It shows further melodic and harmonic progression. A blue circle highlights a passage in the treble clef.

The fourth system of the musical score. It continues the piece with intricate melodic lines and accompaniment. A blue circle highlights a passage in the treble clef.

The fifth and final system of the musical score on this page. It concludes the piece with a final cadence. A blue circle highlights a passage in the treble clef.

Dieterich Buxtehude

um 1637 – 1707

Präludium D BuxWV139

70

Musical score for measures 70-74. The system consists of three staves: Treble, Bass, and Bass. The key signature is two sharps (F# and C#). Measure 70 starts with a treble clef and a 7/8 time signature. The music features complex rhythmic patterns with many beamed notes and rests. The bass line is active throughout, with some rests in later measures.

75

Musical score for measures 75-79. The system consists of three staves: Treble, Bass, and Bass. The key signature is two sharps. Measure 75 starts with a treble clef and a 7/8 time signature. The music continues with complex rhythmic patterns. The bass line has several measures of rest, particularly in measures 77 and 79.

80

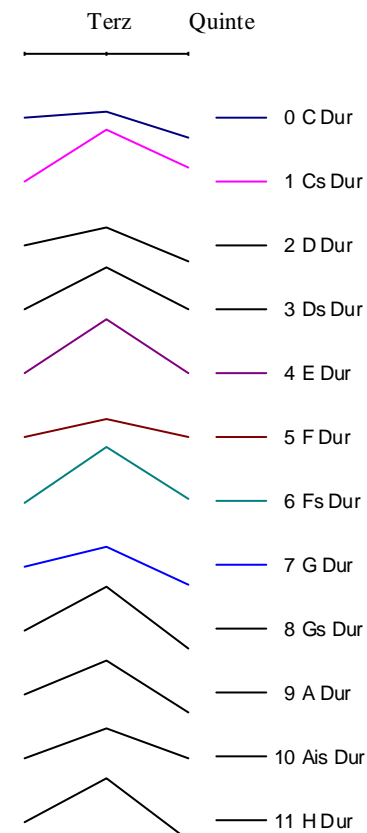
Musical score for measures 80-84. The system consists of three staves: Treble, Bass, and Bass. The key signature is two sharps. Measure 80 starts with a treble clef and a 7/8 time signature. The music continues with complex rhythmic patterns. The bass line has several measures of rest, particularly in measures 82 and 84.

85

90

Musical score for measures 85-90. The system consists of three staves: Treble, Bass, and Bass. The key signature is two sharps. Measure 85 starts with a treble clef and a 7/8 time signature. A blue circle highlights a section of the music in measures 86-87. Measure 88 is a whole rest in the treble clef. Measure 89 is a whole rest in the treble clef. Measure 90 is a whole rest in the treble clef. The bass line continues with rhythmic patterns throughout.

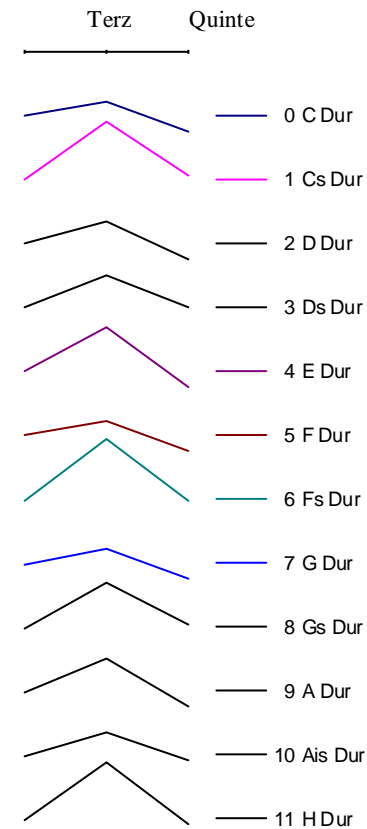
Stimmung		Eingabe			Differenz zur reinen		
Bach, J. Seb./Kellner		Centab-		Terz	Quinte	Terz	Quinte
20		Skala	weichung	Cent	386,3	13,7	-2,0
C Dur	8,0	0,0	0,0	389,0	697,0	2,7	-5,0
Cs Dur	-1,0	-9,0	91,0	407,0	706,0	20,7	4,0
D Dur	2,0	-6,0	194,0	394,0	698,0	7,7	-4,0
Ds Dur	2,0	-6,0	294,0	403,0	702,0	16,7	0,0
E Dur	-3,0	-11,0	389,0	408,0	702,0	21,7	0,0
F Dur	6,0	-2,0	498,0	394,0	702,0	7,7	0,0
Fs Dur	-4,0	-12,0	588,0	408,0	703,0	21,7	1,0
G Dur	5,0	-3,0	697,0	394,0	697,0	7,7	-5,0
Gs Dur	5,0	-3,0	797,0	403,0	697,0	16,7	-5,0
A Dur	0,0	-8,0	892,0	399,0	697,0	12,7	-5,0
Ais Dur	4,0	-4,0	996,0	398,0	702,0	11,7	0,0
H Dur	-1,0	-9,0	1091,0	403,0	697,0	16,7	-5,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E	-11,0 389,0	Cs - F	7,0 407,0	D - Fs	-6,0 394,0	Ds - G	3,0 403,0
E - Gs	8,0 408,0	F - A	-6,0 394,0	Fs - Ais	8,0 408,0	G - H	-6,0 394,0
Gs - C	3,0 403,0	A - Cs	-1,0 399,0	Ais - D	-2,0 398,0	H - Ds	3,0 403,0
Quinte		Quinte		Quinte		Quinte	
C-G	-3,0 697,0	G-D	-3,0 697,0	D-A	-2,0 698,0	A-E	-3,0 697,0
E-H	2,0 702,0	H-Fs	-3,0 697,0	Fs-Cs	3,0 703,0	Cs-Gs	6,0 706,0
Gs-Ds	-3,0 697,0	Ds-Ais	2,0 702,0	Ais-F	2,0 702,0	F-C	2,0 702,0

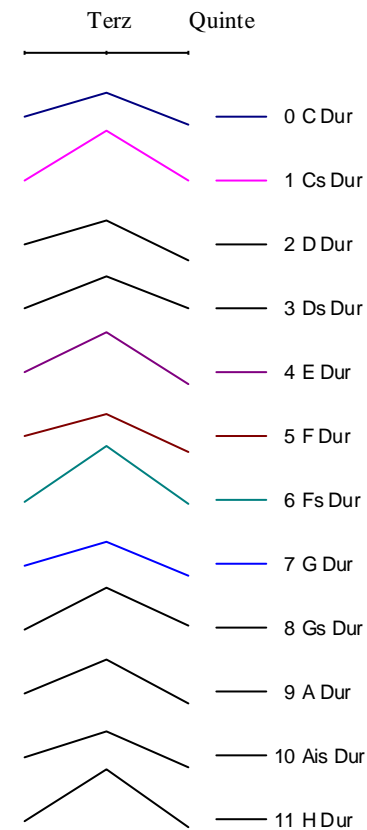
Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Voigt 2,6 12	Skala					Terz	Quinte
C Dur	6,0	0,0	0,0	392,0	698,0	5,7	-4,0
Cs Dur	-1,0	-7,0	93,0	409,0	703,0	22,7	1,0
D Dur	2,0	-4,0	196,0	395,0	698,0	8,7	-4,0
Ds Dur	5,0	-1,0	299,0	399,0	702,0	12,7	0,0
E Dur	-2,0	-8,0	392,0	404,0	698,0	17,7	-4,0
F Dur	8,0	2,0	502,0	392,0	698,0	5,7	-4,0
Fs Dur	-3,0	-9,0	591,0	410,0	702,0	23,7	0,0
G Dur	4,0	-2,0	698,0	392,0	698,0	5,7	-4,0
Gs Dur	2,0	-4,0	796,0	404,0	703,0	17,7	1,0
A Dur	0,0	-6,0	894,0	399,0	698,0	12,7	-4,0
Ais Dur	7,0	1,0	1001,0	395,0	701,0	8,7	-1,0
H Dur	-4,0	-10,0	1090,0	409,0	701,0	22,7	-1,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz	Terz	Terz	Terz
C - E -8,0 392,0	Cs - F 9,0 409,0	D - Fs -5,0 395,0	Ds - G -1,0 399,0
E - Gs 4,0 404,0	F - A -8,0 392,0	Fs - Ais 10,0 410,0	G - H -8,0 392,0
Gs - C 4,0 404,0	A - Cs -1,0 399,0	Ais - D -5,0 395,0	H - Ds 9,0 409,0
Quinte	Quinte	Quinte	Quinte
C-G -2,0 698,0	G-D -2,0 698,0	D-A -2,0 698,0	A-E -2,0 698,0
E-H -2,0 698,0	H-Fs 1,0 701,0	Fs-Cs 2,0 702,0	Cs-Gs 3,0 703,0
Gs-Ds 3,0 703,0	Ds-Ais 2,0 702,0	Ais-F 1,0 701,0	F-C -2,0 698,0

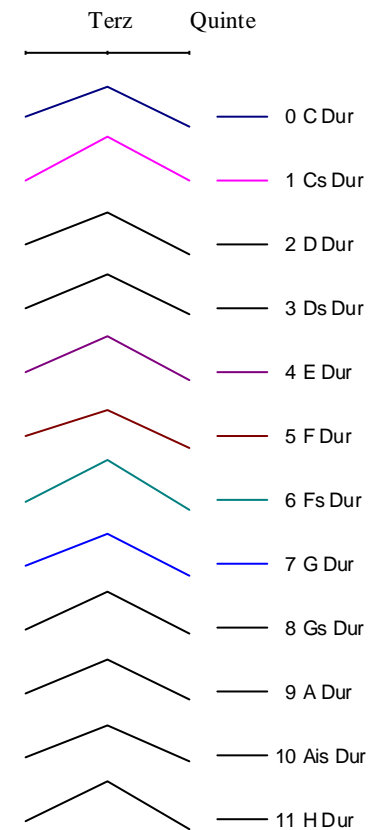
Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Voigt 2,3 9	Skala					Terz	Quinte
C Dur	3,0	0,0	0,0	396,0	700,0	9,7	-2,0
Cs Dur	-1,0	-4,0	96,0	406,0	702,0	19,7	0,0
D Dur	2,0	-1,0	199,0	396,0	698,0	9,7	-4,0
Ds Dur	4,0	1,0	301,0	399,0	702,0	12,7	0,0
E Dur	-1,0	-4,0	396,0	402,0	699,0	15,7	-3,0
F Dur	5,0	2,0	502,0	395,0	698,0	8,7	-4,0
Fs Dur	-2,0	-5,0	595,0	408,0	701,0	21,7	-1,0
G Dur	3,0	0,0	700,0	395,0	699,0	8,7	-3,0
Gs Dur	1,0	-2,0	798,0	402,0	703,0	15,7	1,0
A Dur	0,0	-3,0	897,0	399,0	699,0	12,7	-3,0
Ais Dur	6,0	3,0	1003,0	396,0	699,0	9,7	-3,0
H Dur	-2,0	-5,0	1095,0	406,0	700,0	19,7	-2,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E -4,0	396,0	Cs - F 6,0	406,0	D - Fs -4,0	396,0	Ds - G -1,0	399,0
E - Gs 2,0	402,0	F - A -5,0	395,0	Fs - Ais 8,0	408,0	G - H -5,0	395,0
Gs - C 2,0	402,0	A - Cs -1,0	399,0	Ais - D -4,0	396,0	H - Ds 6,0	406,0
Quinte		Quinte		Quinte		Quinte	
C-G 0,0	700,0	G-D -1,0	699,0	D-A -2,0	698,0	A-E -1,0	699,0
E-H -1,0	699,0	H-Fs 0,0	700,0	Fs-Cs 1,0	701,0	Cs-Gs 2,0	702,0
Gs-Ds 3,0	703,0	Ds-Ais 2,0	702,0	Ais-F -1,0	699,0	F-C -2,0	698,0

Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Voigt 1,0 6	Skala					Terz	Quinte
C Dur	2,0	0,0	0,0	398,0	699,5	11,7	-2,5
Cs Dur	-1,0	-3,0	97,0	404,0	702,0	17,7	0,0
D Dur	0,5	-1,5	198,5	399,0	699,5	12,7	-2,5
Ds Dur	1,5	-0,5	299,5	400,0	700,5	13,7	-1,5
E Dur	0,0	-2,0	398,0	401,0	700,0	14,7	-2,0
F Dur	3,0	1,0	501,0	397,0	699,0	10,7	-3,0
Fs Dur	-0,5	-2,5	597,5	402,5	699,5	16,2	-2,5
G Dur	1,5	-0,5	699,5	398,5	699,0	12,2	-3,0
Gs Dur	1,0	-1,0	799,0	401,0	700,5	14,7	-1,5
A Dur	0,0	-2,0	898,0	399,0	700,0	12,7	-2,0
Ais Dur	2,0	0,0	1000,0	398,5	701,0	12,2	-1,0
H Dur	0,0	-2,0	1098,0	401,5	699,5	15,2	-2,5



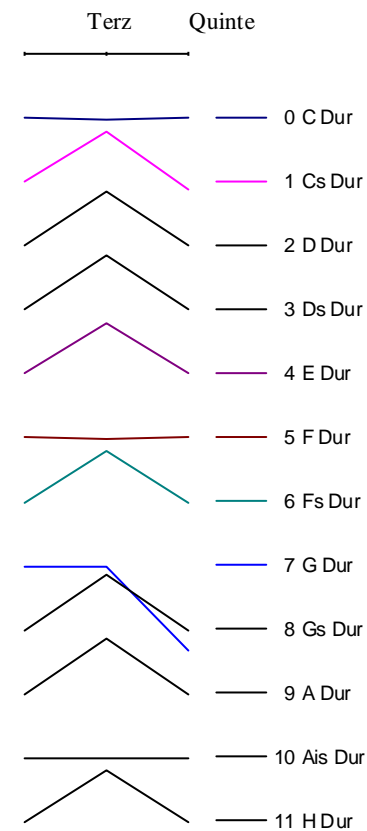
Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E -2,0	398,0	Cs - F 4,0	404,0	D - Fs -1,0	399,0	Ds - G 0,0	400,0
E - Gs 1,0	401,0	F - A -3,0	397,0	Fs - Ais 2,5	402,5	G - H -1,5	398,5
Gs - C 1,0	401,0	A - Cs -1,0	399,0	Ais - D -1,5	398,5	H - Ds 1,5	401,5
Quinte		Quinte		Quinte		Quinte	
C-G -0,5	699,5	G-D -1,0	699,0	D-A -0,5	699,5	A-E 0,0	700,0
E-H 0,0	700,0	H-Fs -0,5	699,5	Fs-Cs -0,5	699,5	Cs-Gs 2,0	702,0
Gs-Ds 0,5	700,5	Ds-Ais 0,5	700,5	Ais-F 1,0	701,0	F-C -1,0	699,0

Erste Versuche einer modifizierten Stimmung

um 1700

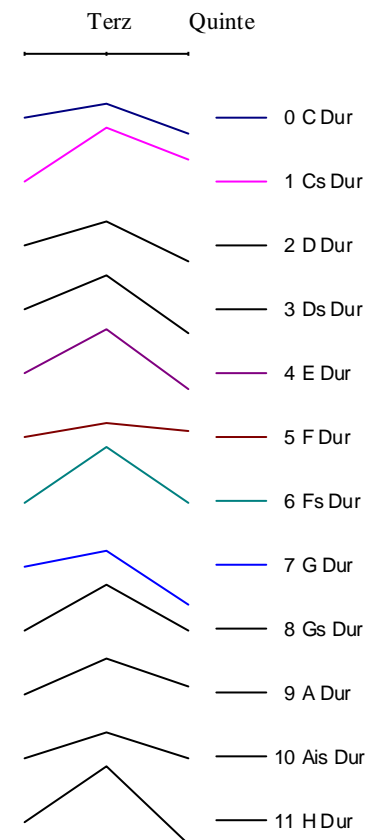
Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Pareja	Skala					Terz	Quinte
57						13,7	-2,0
C Dur	16,0	0,0	0,0	386,0	702,0	-0,3	0,0
Cs Dur	8,0	-8,0	92,0	406,0	700,0	19,7	-2,0
D Dur	-2,0	-18,0	182,0	408,0	702,0	21,7	0,0
Ds Dur	10,0	-6,0	294,0	408,0	702,0	21,7	0,0
E Dur	2,0	-14,0	386,0	406,0	702,0	19,7	0,0
F Dur	14,0	-2,0	498,0	386,0	702,0	-0,3	0,0
Fs Dur	6,0	-10,0	590,0	406,0	702,0	19,7	0,0
G Dur	18,0	2,0	702,0	386,0	680,0	-0,3	-22,0
Gs Dur	8,0	-8,0	792,0	408,0	702,0	21,7	0,0
A Dur	0,0	-16,0	884,0	408,0	702,0	21,7	0,0
Ais Dur	12,0	-4,0	996,0	386,0	702,0	-0,3	0,0
H Dur	4,0	-12,0	1088,0	406,0	702,0	19,7	0,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E -14,0	386,0	Cs - F 6,0	406,0	D - Fs 8,0	408,0	Ds - G 8,0	408,0
E - Gs 6,0	406,0	F - A -14,0	386,0	Fs - Ais 6,0	406,0	G - H -14,0	386,0
Gs - C 8,0	408,0	A - Cs 8,0	408,0	Ais - D -14,0	386,0	H - Ds 6,0	406,0
Quinte		Quinte		Quinte		Quinte	
C-G 2,0	702,0	G-D -20,0	680,0	D-A 2,0	702,0	A-E 2,0	702,0
E-H 2,0	702,0	H-Fs 2,0	702,0	Fs-Cs 2,0	702,0	Cs-Gs 0,0	700,0
Gs-Ds 2,0	702,0	Ds-Ais 2,0	702,0	Ais-F 2,0	702,0	F-C 2,0	702,0

Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Valotti	Skala					Terz	Quinte
78						13,7	-2,0
C Dur	12,0	0,0	0,0	392,0	698,0	5,7	-4,0
Cs Dur	0,0	-12,0	88,0	408,0	708,0	21,7	6,0
D Dur	2,0	-10,0	190,0	396,0	698,0	9,7	-4,0
Ds Dur	10,0	-2,0	298,0	400,0	696,0	13,7	-6,0
E Dur	4,0	-8,0	392,0	404,0	698,0	17,7	-4,0
F Dur	8,0	-4,0	496,0	392,0	704,0	5,7	2,0
Fs Dur	-2,0	-14,0	586,0	408,0	702,0	21,7	0,0
G Dur	10,0	-2,0	698,0	392,0	692,0	5,7	-10,0
Gs Dur	8,0	-4,0	796,0	404,0	702,0	17,7	0,0
A Dur	0,0	-12,0	888,0	400,0	704,0	13,7	2,0
Ais Dur	6,0	-6,0	994,0	396,0	702,0	9,7	0,0
H Dur	2,0	-10,0	1090,0	408,0	696,0	21,7	-6,0

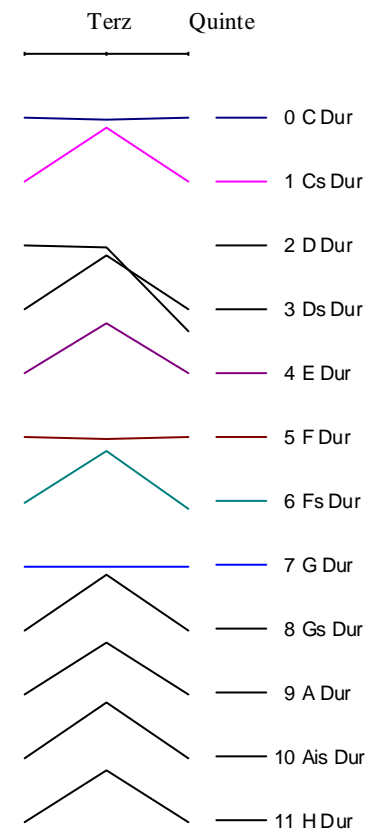


Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E -8,0	392,0	Cs - F 8,0	408,0	D - Fs -4,0	396,0	Ds - G 0,0	400,0
E - Gs 4,0	404,0	F - A -8,0	392,0	Fs - Ais 8,0	408,0	G - H -8,0	392,0
Gs - C 4,0	404,0	A - Cs 0,0	400,0	Ais - D -4,0	396,0	H - Ds 8,0	408,0
Quinte		Quinte		Quinte		Quinte	
C-G -2,0	698,0	G-D -8,0	692,0	D-A -2,0	698,0	A-E 4,0	704,0
E-H -2,0	698,0	H-Fs -4,0	696,0	Fs-Cs 2,0	702,0	Cs-Gs 8,0	708,0
Gs-Ds 2,0	702,0	Ds-Ais -4,0	696,0	Ais-F 2,0	702,0	F-C 4,0	704,0

Kirnberger

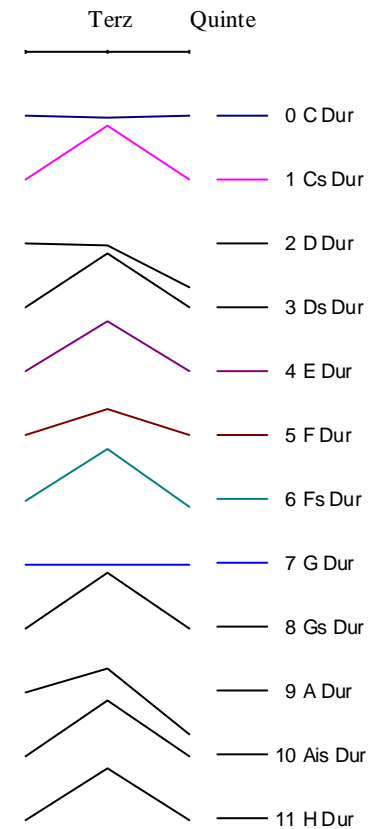
Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Kirnberger 1 41	Skala					Terz	Quinte
C Dur	16,0	0,0	0,0	386,0	702,0	-0,3	0,0
Cs Dur	6,0	-10,0	90,0	408,0	702,0	21,7	0,0
D Dur	20,0	4,0	204,0	386,0	680,0	-0,3	-22,0
Ds Dur	10,0	-6,0	294,0	408,0	702,0	21,7	0,0
E Dur	2,0	-14,0	386,0	406,0	702,0	19,7	0,0
F Dur	14,0	-2,0	498,0	386,0	702,0	-0,3	0,0
Fs Dur	6,0	-10,0	590,0	406,0	700,0	19,7	-2,0
G Dur	18,0	2,0	702,0	386,0	702,0	-0,3	0,0
Gs Dur	8,0	-8,0	792,0	408,0	702,0	21,7	0,0
A Dur	0,0	-16,0	884,0	406,0	702,0	19,7	0,0
Ais Dur	12,0	-4,0	996,0	408,0	702,0	21,7	0,0
H Dur	4,0	-12,0	1088,0	406,0	702,0	19,7	0,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E -14,0	386,0	Cs - F 8,0	408,0	D - Fs -14,0	386,0	Ds - G 8,0	408,0
E - Gs 6,0	406,0	F - A -14,0	386,0	Fs - Ais 6,0	406,0	G - H -14,0	386,0
Gs - C 8,0	408,0	A - Cs 6,0	406,0	Ais - D 8,0	408,0	H - Ds 6,0	406,0
Quinte		Quinte		Quinte		Quinte	
C-G 2,0	702,0	G-D 2,0	702,0	D-A -20,0	680,0	A-E 2,0	702,0
E-H 2,0	702,0	H-Fs 2,0	702,0	Fs-Cs 0,0	700,0	Cs-Gs 2,0	702,0
Gs-Ds 2,0	702,0	Ds-Ais 2,0	702,0	Ais-F 2,0	702,0	F-C 2,0	702,0

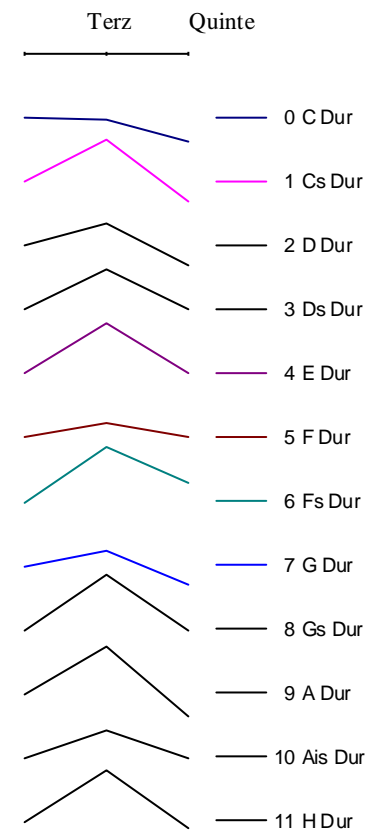
Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Kirnberger 2 42	Skala					Terz	Quinte
C Dur	5,0	0,0	0,0	386,0	702,0	-0,3	0,0
Cs Dur	-5,0	-10,0	90,0	408,0	702,0	21,7	0,0
D Dur	9,0	4,0	204,0	386,0	691,0	-0,3	-11,0
Ds Dur	-1,0	-6,0	294,0	408,0	702,0	21,7	0,0
E Dur	-9,0	-14,0	386,0	406,0	702,0	19,7	0,0
F Dur	3,0	-2,0	498,0	397,0	702,0	10,7	0,0
Fs Dur	-5,0	-10,0	590,0	406,0	700,0	19,7	-2,0
G Dur	7,0	2,0	702,0	386,0	702,0	-0,3	0,0
Gs Dur	-3,0	-8,0	792,0	408,0	702,0	21,7	0,0
A Dur	0,0	-5,0	895,0	395,0	691,0	8,7	-11,0
Ais Dur	1,0	-4,0	996,0	408,0	702,0	21,7	0,0
H Dur	-7,0	-12,0	1088,0	406,0	702,0	19,7	0,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz	Terz	Terz	Terz
C - E -14,0 386,0	Cs - F 8,0 408,0	D - Fs -14,0 386,0	Ds - G 8,0 408,0
E - Gs 6,0 406,0	F - A -3,0 397,0	Fs - Ais 6,0 406,0	G - H -14,0 386,0
Gs - C 8,0 408,0	A - Cs -5,0 395,0	Ais - D 8,0 408,0	H - Ds 6,0 406,0
Quinte	Quinte	Quinte	Quinte
C-G 2,0 702,0	G-D 2,0 702,0	D-A -9,0 691,0	A-E -9,0 691,0
E-H 2,0 702,0	H-Fs 2,0 702,0	Fs-Cs 0,0 700,0	Cs-Gs 2,0 702,0
Gs-Ds 2,0 702,0	Ds-Ais 2,0 702,0	Ais-F 2,0 702,0	F-C 2,0 702,0

Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Kirnberger 3 43	Skala					Terz	Quinte
C Dur	10,0	0,0	0,0	386,0	696,0	-0,3	-6,0
Cs Dur	5,0	-5,0	95,0	403,0	697,0	16,7	-5,0
D Dur	3,0	-7,0	193,0	395,0	697,0	8,7	-5,0
Ds Dur	4,0	-6,0	294,0	402,0	702,0	15,7	0,0
E Dur	-4,0	-14,0	386,0	406,0	702,0	19,7	0,0
F Dur	8,0	-2,0	498,0	392,0	702,0	5,7	0,0
Fs Dur	-2,0	-12,0	588,0	408,0	707,0	21,7	5,0
G Dur	6,0	-4,0	696,0	392,0	697,0	5,7	-5,0
Gs Dur	2,0	-8,0	792,0	408,0	702,0	21,7	0,0
A Dur	0,0	-10,0	890,0	405,0	696,0	18,7	-6,0
Ais Dur	6,0	-4,0	996,0	397,0	702,0	10,7	0,0
H Dur	-2,0	-12,0	1088,0	406,0	700,0	19,7	-2,0

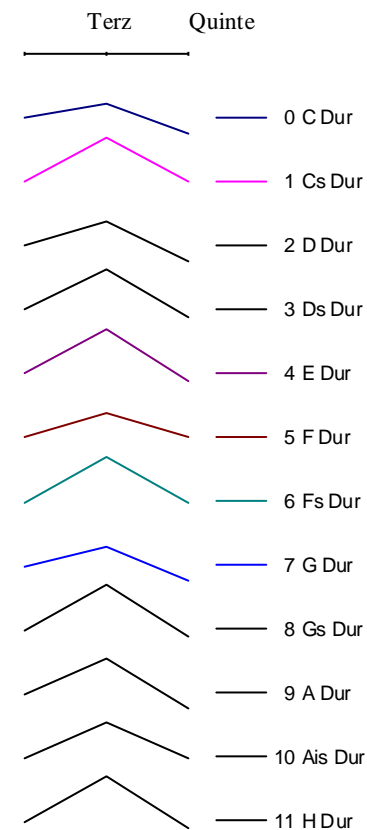


Abweichung zur gleichstufigen Temperierung in Cent:

Terz	Terz	Terz	Terz
C - E -14,0 386,0	Cs - F 3,0 403,0	D - Fs -5,0 395,0	Ds - G 2,0 402,0
E - Gs 6,0 406,0	F - A -8,0 392,0	Fs - Ais 8,0 408,0	G - H -8,0 392,0
Gs - C 8,0 408,0	A - Cs 5,0 405,0	Ais - D -3,0 397,0	H - Ds 6,0 406,0
Quinte	Quinte	Quinte	Quinte
C-G -4,0 696,0	G-D -3,0 697,0	D-A -3,0 697,0	A-E -4,0 696,0
E-H 2,0 702,0	H-Fs 0,0 700,0	Fs-Cs 7,0 707,0	Cs-Gs -3,0 697,0
Gs-Ds 2,0 702,0	Ds-Ais 2,0 702,0	Ais-F 2,0 702,0	F-C 2,0 702,0

Neidhardt

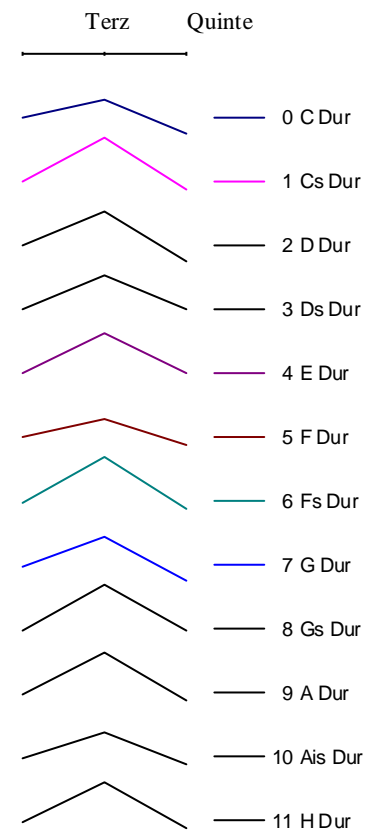
Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Neidhardt 1 53	Skala					Terz	Quinte
C Dur	6,0	0,0	0,0	392,0	698,0	5,7	-4,0
Cs Dur	0,0	-6,0	94,0	404,0	702,0	17,7	0,0
D Dur	2,0	-4,0	196,0	396,0	698,0	9,7	-4,0
Ds Dur	2,0	-4,0	296,0	402,0	700,0	15,7	-2,0
E Dur	-2,0	-8,0	392,0	404,0	700,0	17,7	-2,0
F Dur	4,0	-2,0	498,0	396,0	702,0	9,7	0,0
Fs Dur	-2,0	-8,0	592,0	404,0	702,0	17,7	0,0
G Dur	4,0	-2,0	698,0	394,0	698,0	7,7	-4,0
Gs Dur	2,0	-4,0	796,0	404,0	700,0	17,7	-2,0
A Dur	0,0	-6,0	894,0	400,0	698,0	13,7	-4,0
Ais Dur	2,0	-4,0	996,0	400,0	702,0	13,7	0,0
H Dur	-2,0	-8,0	1092,0	404,0	700,0	17,7	-2,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz	Terz	Terz	Terz
C - E -8,0 392,0	Cs - F 4,0 404,0	D - Fs -4,0 396,0	Ds - G 2,0 402,0
E - Gs 4,0 404,0	F - A -4,0 396,0	Fs - Ais 4,0 404,0	G - H -6,0 394,0
Gs - C 4,0 404,0	A - Cs 0,0 400,0	Ais - D 0,0 400,0	H - Ds 4,0 404,0
Quinte	Quinte	Quinte	Quinte
C-G -2,0 698,0	G-D -2,0 698,0	D-A -2,0 698,0	A-E -2,0 698,0
E-H 0,0 700,0	H-Fs 0,0 700,0	Fs-Cs 2,0 702,0	Cs-Gs 2,0 702,0
Gs-Ds 0,0 700,0	Ds-Ais 0,0 700,0	Ais-F 2,0 702,0	F-C 2,0 702,0

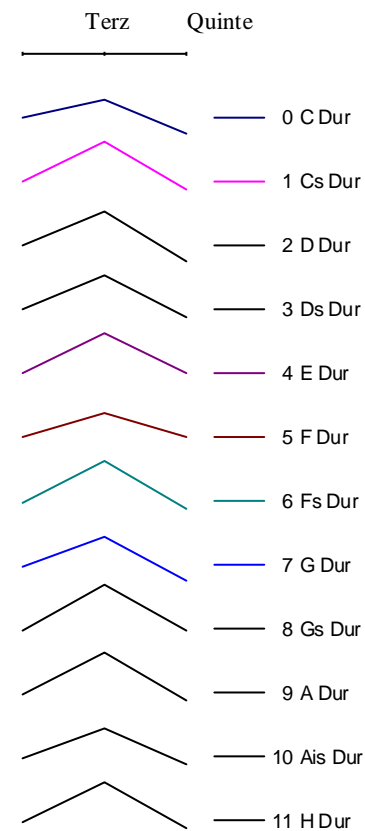
Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Neidhardt 2 54	Skala					Terz	Quinte
C Dur	6,0	0,0	0,0	394,0	698,0	7,7	-4,0
Cs Dur	2,0	-4,0	96,0	404,0	700,0	17,7	-2,0
D Dur	2,0	-4,0	196,0	400,0	698,0	13,7	-4,0
Ds Dur	4,0	-2,0	298,0	400,0	702,0	13,7	0,0
E Dur	0,0	-6,0	394,0	402,0	702,0	15,7	0,0
F Dur	6,0	0,0	500,0	394,0	700,0	7,7	-2,0
Fs Dur	2,0	-4,0	596,0	404,0	700,0	17,7	-2,0
G Dur	4,0	-2,0	698,0	398,0	698,0	11,7	-4,0
Gs Dur	2,0	-4,0	796,0	404,0	702,0	17,7	0,0
A Dur	0,0	-6,0	894,0	402,0	700,0	15,7	-2,0
Ais Dur	6,0	0,0	1000,0	396,0	700,0	9,7	-2,0
H Dur	2,0	-4,0	1096,0	402,0	700,0	15,7	-2,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E -6,0	394,0	Cs - F 4,0	404,0	D - Fs 0,0	400,0	Ds - G 0,0	400,0
E - Gs 2,0	402,0	F - A -6,0	394,0	Fs - Ais 4,0	404,0	G - H -2,0	398,0
Gs - C 4,0	404,0	A - Cs 2,0	402,0	Ais - D -4,0	396,0	H - Ds 2,0	402,0
Quinte		Quinte		Quinte		Quinte	
C-G -2,0	698,0	G-D -2,0	698,0	D-A -2,0	698,0	A-E 0,0	700,0
E-H 2,0	702,0	H-Fs 0,0	700,0	Fs-Cs 0,0	700,0	Cs-Gs 0,0	700,0
Gs-Ds 2,0	702,0	Ds-Ais 2,0	702,0	Ais-F 0,0	700,0	F-C 0,0	700,0

Stimmung		Eingabe Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Differenz zur reinen	
Neidhardt 3 1724 55	Skala					Terz	Quinte
C Dur	6,0	0,0	0,0	394,0	698,0	7,7	-4,0
Cs Dur	2,0	-4,0	96,0	402,0	700,0	15,7	-2,0
D Dur	2,0	-4,0	196,0	400,0	698,0	13,7	-4,0
Ds Dur	4,0	-2,0	298,0	400,0	700,0	13,7	-2,0
E Dur	0,0	-6,0	394,0	402,0	702,0	15,7	0,0
F Dur	4,0	-2,0	498,0	396,0	702,0	9,7	0,0
Fs Dur	2,0	-4,0	596,0	402,0	700,0	15,7	-2,0
G Dur	4,0	-2,0	698,0	398,0	698,0	11,7	-4,0
Gs Dur	2,0	-4,0	796,0	404,0	702,0	17,7	0,0
A Dur	0,0	-6,0	894,0	402,0	700,0	15,7	-2,0
Ais Dur	4,0	-2,0	998,0	398,0	700,0	11,7	-2,0
H Dur	2,0	-4,0	1096,0	402,0	700,0	15,7	-2,0

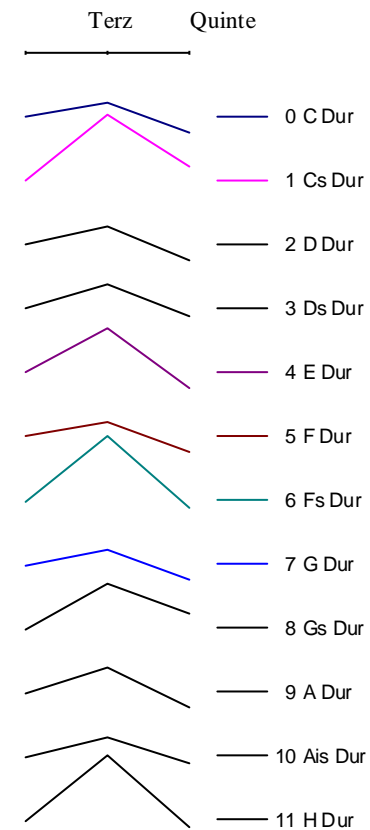


Abweichung zur gleichstufigen Temperierung in Cent:

Terz	Terz	Terz	Terz
C - E -6,0 394,0	Cs - F 2,0 402,0	D - Fs 0,0 400,0	Ds - G 0,0 400,0
E - Gs 2,0 402,0	F - A -4,0 396,0	Fs - Ais 2,0 402,0	G - H -2,0 398,0
Gs - C 4,0 404,0	A - Cs 2,0 402,0	Ais - D -2,0 398,0	H - Ds 2,0 402,0
Quinte	Quinte	Quinte	Quinte
C-G -2,0 698,0	G-D -2,0 698,0	D-A -2,0 698,0	A-E 0,0 700,0
E-H 2,0 702,0	H-Fs 0,0 700,0	Fs-Cs 0,0 700,0	Cs-Gs 0,0 700,0
Gs-Ds 2,0 702,0	Ds-Ais 0,0 700,0	Ais-F 0,0 700,0	F-C 2,0 702,0

Arnold Schlick

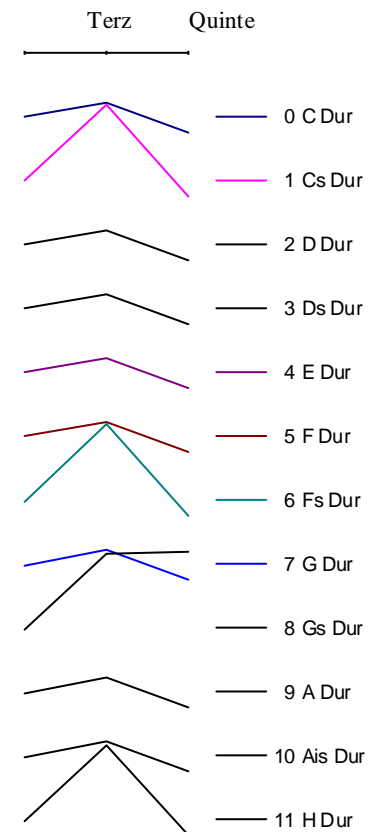
Stimmung		Eingabe			Differenz zur reinen		
Schlick, Arnoldt/J.M. 64		Centab- weichung	Cent	Terz 386,3	Quinte 702,0	Terz 13,7	Quinte -2,0
Skala							
C Dur	6,0	0,0	0,0	392,0	698,0	5,7	-4,0
Cs Dur	-4,0	-10,0	90,0	412,0	706,0	25,7	4,0
D Dur	2,0	-4,0	196,0	394,0	698,0	7,7	-4,0
Ds Dur	8,0	2,0	302,0	396,0	700,0	9,7	-2,0
E Dur	-2,0	-8,0	392,0	404,0	698,0	17,7	-4,0
F Dur	8,0	2,0	502,0	392,0	698,0	5,7	-4,0
Fs Dur	-4,0	-10,0	590,0	412,0	700,0	25,7	-2,0
G Dur	4,0	-2,0	698,0	392,0	698,0	5,7	-4,0
Gs Dur	2,0	-4,0	796,0	404,0	706,0	17,7	4,0
A Dur	0,0	-6,0	894,0	396,0	698,0	9,7	-4,0
Ais Dur	8,0	2,0	1002,0	394,0	700,0	7,7	-2,0
H Dur	-4,0	-10,0	1090,0	412,0	700,0	25,7	-2,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E -8,0	392,0	Cs - F 12,0	412,0	D - Fs -6,0	394,0	Ds - G -4,0	396,0
E - Gs 4,0	404,0	F - A -8,0	392,0	Fs - Ais 12,0	412,0	G - H -8,0	392,0
Gs - C 4,0	404,0	A - Cs -4,0	396,0	Ais - D -6,0	394,0	H - Ds 12,0	412,0
Quinte		Quinte		Quinte		Quinte	
C-G -2,0	698,0	G-D -2,0	698,0	D-A -2,0	698,0	A-E -2,0	698,0
E-H -2,0	698,0	H-Fs 0,0	700,0	Fs-Cs 0,0	700,0	Cs-Gs 6,0	706,0
Gs-Ds 6,0	706,0	Ds-Ais 0,0	700,0	Ais-F 0,0	700,0	F-C -2,0	698,0

Stimmung		Eingabe	Differenz zur reinen				
Silbermann, Gottfried		Centab-		Terz	Quinte	Terz	Quinte
71		weichung	Cent	386,3	702,0	13,7	-2,0
	Skala						
C Dur	6,0	0,0	0,0	392,0	698,0	5,7	-4,0
Cs Dur	-8,0	-14,0	86,0	416,0	698,0	29,7	-4,0
D Dur	2,0	-4,0	196,0	392,0	698,0	5,7	-4,0
Ds Dur	12,0	6,0	306,0	392,0	698,0	5,7	-4,0
E Dur	-2,0	-8,0	392,0	392,0	698,0	5,7	-4,0
F Dur	8,0	2,0	502,0	392,0	698,0	5,7	-4,0
Fs Dur	-6,0	-12,0	588,0	416,0	698,0	29,7	-4,0
G Dur	4,0	-2,0	698,0	392,0	698,0	5,7	-4,0
Gs Dur	-10,0	-16,0	784,0	416,0	722,0	29,7	20,0
A Dur	0,0	-6,0	894,0	392,0	698,0	5,7	-4,0
Ais Dur	10,0	4,0	1004,0	392,0	698,0	5,7	-4,0
H Dur	-4,0	-10,0	1090,0	416,0	698,0	29,7	-4,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E	-8,0 392,0	Cs - F	16,0 416,0	D - Fs	-8,0 392,0	Ds - G	-8,0 392,0
E - Gs	-8,0 392,0	F - A	-8,0 392,0	Fs - Ais	16,0 416,0	G - H	-8,0 392,0
Gs - C	16,0 416,0	A - Cs	-8,0 392,0	Ais - D	-8,0 392,0	H - Ds	16,0 416,0
Quinte		Quinte		Quinte		Quinte	
C-G	-2,0 698,0	G-D	-2,0 698,0	D-A	-2,0 698,0	A-E	-2,0 698,0
E-H	-2,0 698,0	H-Fs	-2,0 698,0	Fs-Cs	-2,0 698,0	Cs-Gs	-2,0 698,0
Gs-Ds	22,0 722,0	Ds-Ais	-2,0 698,0	Ais-F	-2,0 698,0	F-C	-2,0 698,0

... in welcher Stimmung

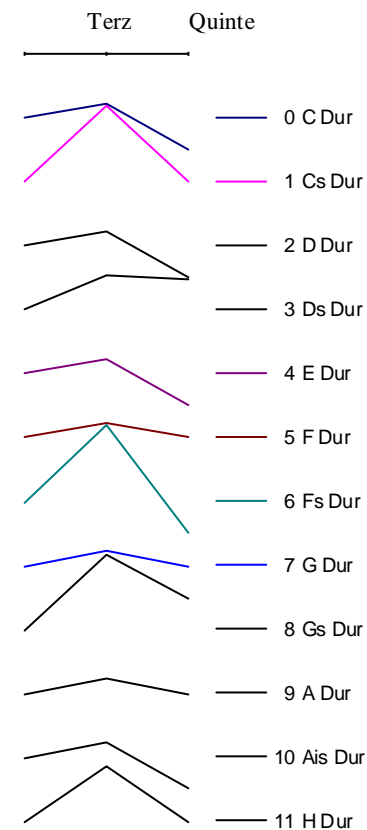
komponierte

welcher Komponist ???

Beispiele

Stimmungssysteme nach Werckmeister

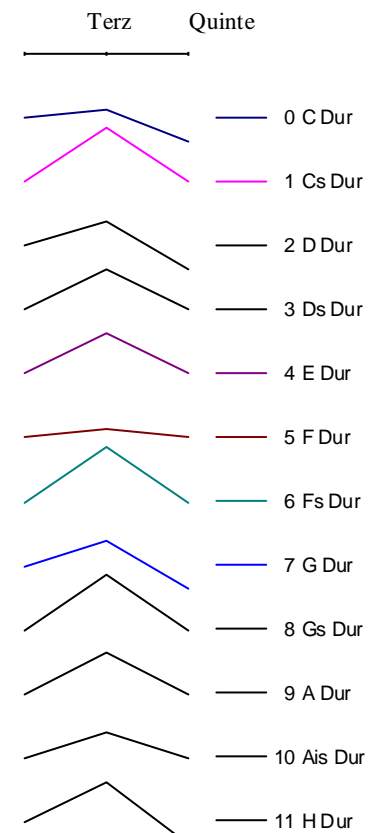
Stimmung		Eingabe	Differenz zur reinen				
Werckmeister 1		Centab-		Terz	Quinte	Terz	Quinte
81		weigung	Cent	386,3	702,0	13,7	-2,0
Skala							
C Dur	10,0	0,0	0,0	392,0	694,0	5,7	-8,0
Cs Dur	-8,0	-18,0	82,0	416,0	702,0	29,7	0,0
D Dur	6,0	-4,0	196,0	392,0	694,0	5,7	-8,0
Ds Dur	4,0	-6,0	294,0	400,0	710,0	13,7	8,0
E Dur	2,0	-8,0	392,0	392,0	694,0	5,7	-8,0
F Dur	8,0	-2,0	498,0	392,0	702,0	5,7	0,0
Fs Dur	-2,0	-12,0	588,0	416,0	694,0	29,7	-8,0
G Dur	4,0	-6,0	694,0	392,0	702,0	5,7	0,0
Gs Dur	-6,0	-16,0	784,0	416,0	710,0	29,7	8,0
A Dur	0,0	-10,0	890,0	392,0	702,0	5,7	0,0
Ais Dur	14,0	4,0	1004,0	392,0	694,0	5,7	-8,0
H Dur	-4,0	-14,0	1086,0	408,0	702,0	21,7	0,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz		Terz		Terz		Terz	
C - E -8,0	392,0	Cs - F 16,0	416,0	D - Fs -8,0	392,0	Ds - G 0,0	400,0
E - Gs -8,0	392,0	F - A -8,0	392,0	Fs - Ais 16,0	416,0	G - H -8,0	392,0
Gs - C 16,0	416,0	A - Cs -8,0	392,0	Ais - D -8,0	392,0	H - Ds 8,0	408,0
Quinte		Quinte		Quinte		Quinte	
C-G -6,0	694,0	G-D 2,0	702,0	D-A -6,0	694,0	A-E 2,0	702,0
E-H -6,0	694,0	H-Fs 2,0	702,0	Fs-Cs -6,0	694,0	Cs-Gs 2,0	702,0
Gs-Ds 10,0	710,0	Ds-Ais 10,0	710,0	Ais-F -6,0	694,0	F-C 2,0	702,0

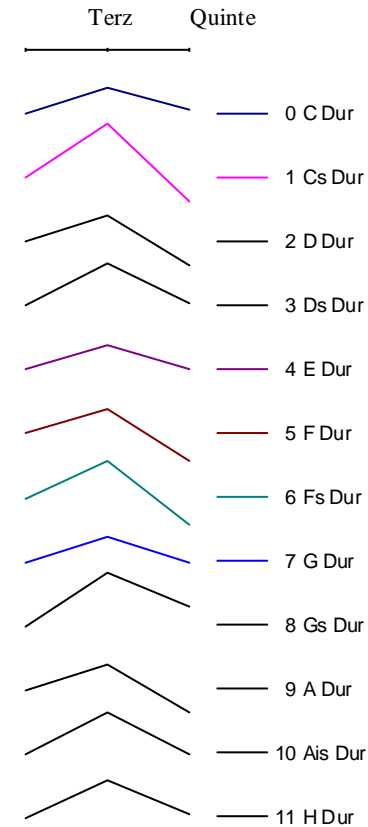
Stimmung		Eingabe	Differenz zur reinen					
Werckmeister 3		Centab-		Terz	Quinte	Terz	Quinte	
82		Skala	weigung	Cent	386,3	702,0	13,7	-2,0
C Dur	12,0	0,0	0,0	390,0	696,0	3,7	-6,0	
Cs Dur	2,0	-10,0	90,0	408,0	702,0	21,7	0,0	
D Dur	4,0	-8,0	192,0	396,0	696,0	9,7	-6,0	
Ds Dur	6,0	-6,0	294,0	402,0	702,0	15,7	0,0	
E Dur	2,0	-10,0	390,0	402,0	702,0	15,7	0,0	
F Dur	10,0	-2,0	498,0	390,0	702,0	3,7	0,0	
Fs Dur	0,0	-12,0	588,0	408,0	702,0	21,7	0,0	
G Dur	8,0	-4,0	696,0	396,0	696,0	9,7	-6,0	
Gs Dur	4,0	-8,0	792,0	408,0	702,0	21,7	0,0	
A Dur	0,0	-12,0	888,0	402,0	702,0	15,7	0,0	
Ais Dur	8,0	-4,0	996,0	396,0	702,0	9,7	0,0	
H Dur	4,0	-8,0	1092,0	402,0	696,0	15,7	-6,0	



Abweichung zur gleichstufigen Temperierung in Cent:

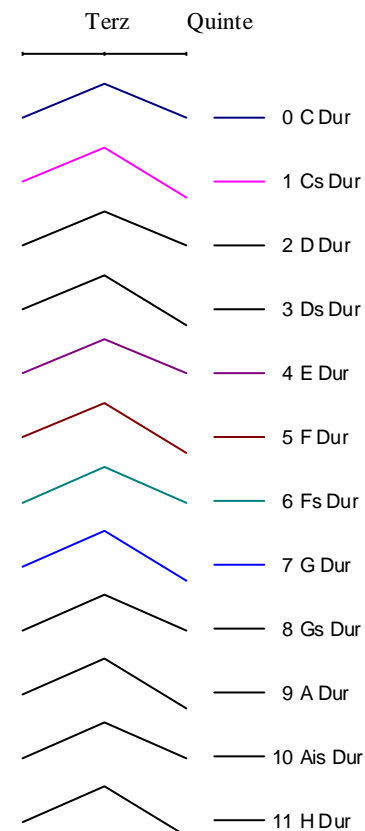
Terz		Terz		Terz		Terz					
C - E	-10,0	390,0	Cs - F	8,0	408,0	D - Fs	-4,0	396,0	Ds - G	2,0	402,0
E - Gs	2,0	402,0	F - A	-10,0	390,0	Fs - Ais	8,0	408,0	G - H	-4,0	396,0
Gs - C	8,0	408,0	A - Cs	2,0	402,0	Ais - D	-4,0	396,0	H - Ds	2,0	402,0
Quinte		Quinte		Quinte		Quinte					
C-G	-4,0	696,0	G-D	-4,0	696,0	D-A	-4,0	696,0	A-E	2,0	702,0
E-H	2,0	702,0	H-Fs	-4,0	696,0	Fs-Cs	2,0	702,0	Cs-Gs	2,0	702,0
Gs-Ds	2,0	702,0	Ds-Ais	2,0	702,0	Ais-F	2,0	702,0	F-C	2,0	702,0

Stimmung		Eingabe	Differenz zur reinen					
Werckmeister 5		Centab-		Terz	Quinte	Terz	Quinte	
84		Skala	weicung	Cent	386,3	702,0	13,7	-2,0
C Dur	-1,0	0,0	0,0	397,0	703,0	10,7	1,0	
Cs Dur	-4,0	-3,0	97,0	408,0	696,0	21,7	-6,0	
D Dur	4,0	5,0	205,0	397,0	696,0	10,7	-6,0	
Ds Dur	-1,0	0,0	300,0	403,0	703,0	16,7	1,0	
E Dur	-4,0	-3,0	397,0	396,0	702,0	9,7	0,0	
F Dur	4,0	5,0	505,0	396,0	695,0	9,7	-7,0	
Fs Dur	1,0	2,0	602,0	401,0	695,0	14,7	-7,0	
G Dur	2,0	3,0	703,0	396,0	702,0	9,7	0,0	
Gs Dur	-8,0	-7,0	793,0	407,0	707,0	20,7	5,0	
A Dur	0,0	1,0	901,0	396,0	696,0	9,7	-6,0	
Ais Dur	2,0	3,0	1003,0	402,0	702,0	15,7	0,0	
H Dur	-2,0	-1,0	1099,0	401,0	703,0	14,7	1,0	



Abweichung zur gleichstufigen Temperierung in Cent:											
Terz		Terz		Terz		Terz					
C - E	-3,0	397,0	Cs - F	8,0	408,0	D - Fs	-3,0	397,0	Ds - G	3,0	403,0
E - Gs	-4,0	396,0	F - A	-4,0	396,0	Fs - Ais	1,0	401,0	G - H	-4,0	396,0
Gs - C	7,0	407,0	A - Cs	-4,0	396,0	Ais - D	2,0	402,0	H - Ds	1,0	401,0
Quinte		Quinte		Quinte		Quinte					
C-G	3,0	703,0	G-D	2,0	702,0	D-A	-4,0	696,0	A-E	-4,0	696,0
E-H	2,0	702,0	H-Fs	3,0	703,0	Fs-Cs	-5,0	695,0	Cs-Gs	-4,0	696,0
Gs-Ds	7,0	707,0	Ds-Ais	3,0	703,0	Ais-F	2,0	702,0	F-C	-5,0	695,0

Stimmung		Eingabe	Differenz zur reinen				
Neidhardt/Joh.Geor		Centab-	Cent	Terz	Quinte	Terz	Quinte
56		weichtung	Cent	386,3	702,0	13,7	-2,0
	Skala						
C Dur	-2,0	0,0	0,0	400,0	702,0	13,7	0,0
Cs Dur	0,0	2,0	102,0	400,0	698,0	13,7	-4,0
D Dur	-2,0	0,0	200,0	400,0	702,0	13,7	0,0
Ds Dur	0,0	2,0	302,0	400,0	698,0	13,7	-4,0
E Dur	-2,0	0,0	400,0	400,0	702,0	13,7	0,0
F Dur	0,0	2,0	502,0	400,0	698,0	13,7	-4,0
Fs Dur	-2,0	0,0	600,0	400,0	702,0	13,7	0,0
G Dur	0,0	2,0	702,0	400,0	698,0	13,7	-4,0
Gs Dur	-2,0	0,0	800,0	400,0	702,0	13,7	0,0
A Dur	0,0	2,0	902,0	400,0	698,0	13,7	-4,0
Ais Dur	-2,0	0,0	1000,0	400,0	702,0	13,7	0,0
H Dur	0,0	2,0	1102,0	400,0	698,0	13,7	-4,0



Abweichung zur gleichstufigen Temperierung in Cent:

Terz	Terz	Terz	Terz
C - E 0,0 400,0	Cs - F 0,0 400,0	D - Fs 0,0 400,0	Ds - G 0,0 400,0
E - Gs 0,0 400,0	F - A 0,0 400,0	Fs - Ais 0,0 400,0	G - H 0,0 400,0
Gs - C 0,0 400,0	A - Cs 0,0 400,0	Ais - D 0,0 400,0	H - Ds 0,0 400,0
Quinte	Quinte	Quinte	Quinte
C-G 2,0 702,0	G-D -2,0 698,0	D-A 2,0 702,0	A-E -2,0 698,0
E-H 2,0 702,0	H-Fs -2,0 698,0	Fs-Cs 2,0 702,0	Cs-Gs -2,0 698,0
Gs-Ds 2,0 702,0	Ds-Ais -2,0 698,0	Ais-F 2,0 702,0	F-C -2,0 698,0

Tasten-

und

Nicht-Tasten-Instrumente

Forschungsarbeit

Ibo Ortgies / Göteborg

- Orientierung am Bass
- je nach vorherrschendem Stimmungssystem
- reine Stimmung

Stimmungssysteme seit der Klassik

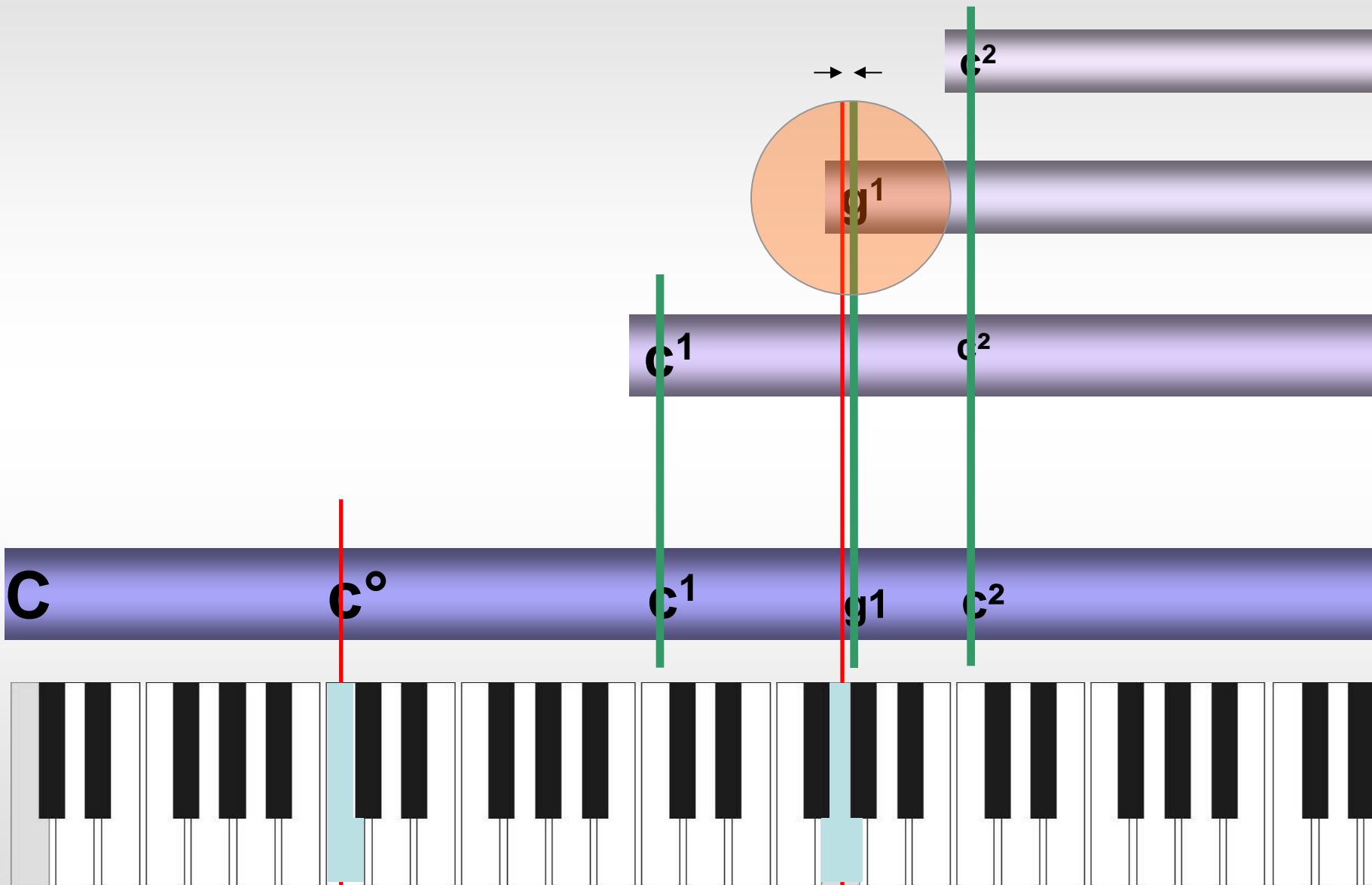
- **Anstreben einer reinen Stimmung
für alle stimmungsflexiblen Instrumente**
- **Tasteninstrumente annähernd
gleichschwebend temperiert/verstimmt**
- **Zunehmende Vermeidung
des Zusammenwirkens mit Orgel**
 - fehlende Dynamik
 - fehlende stimmungsflexibilität

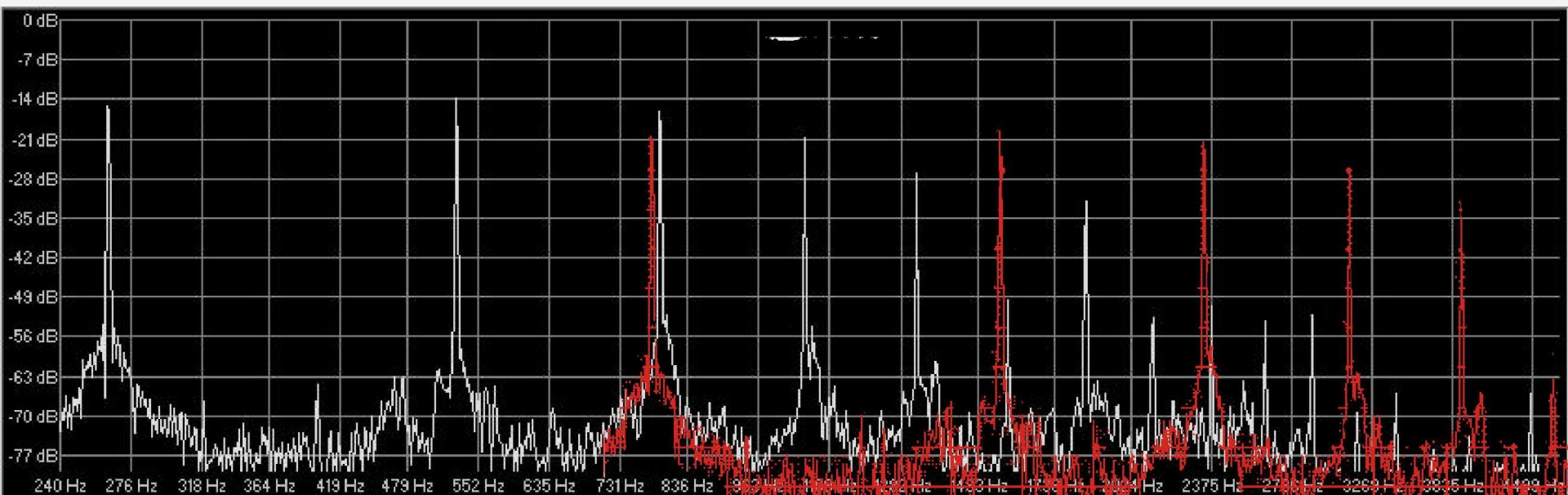
Kompositorisches Denken

seit der Klassik

mit dem Ideal einer reinen Stimmung

- im Ensemblespiel erfolgt ständiges Regulieren





120Hz

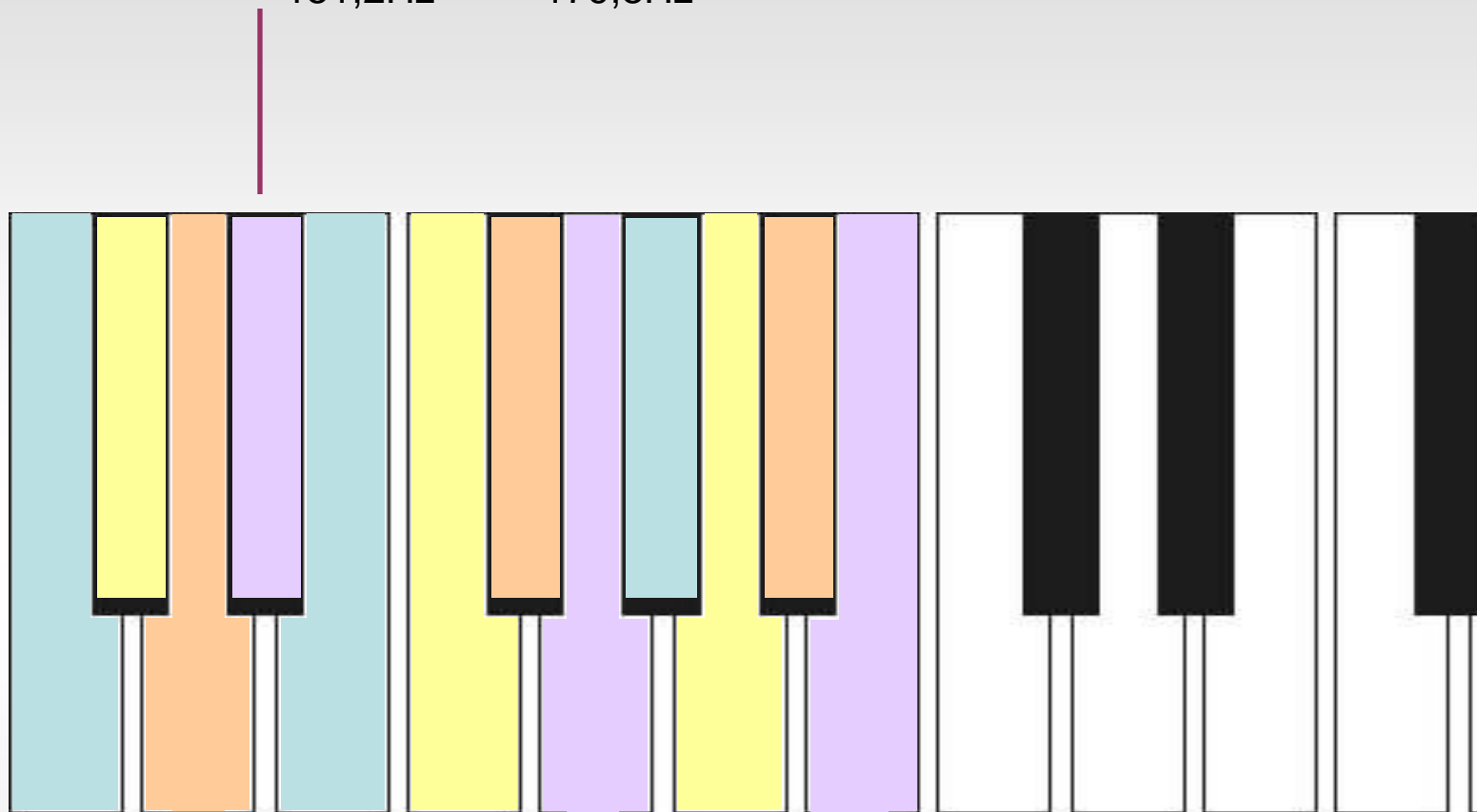
150,0Hz

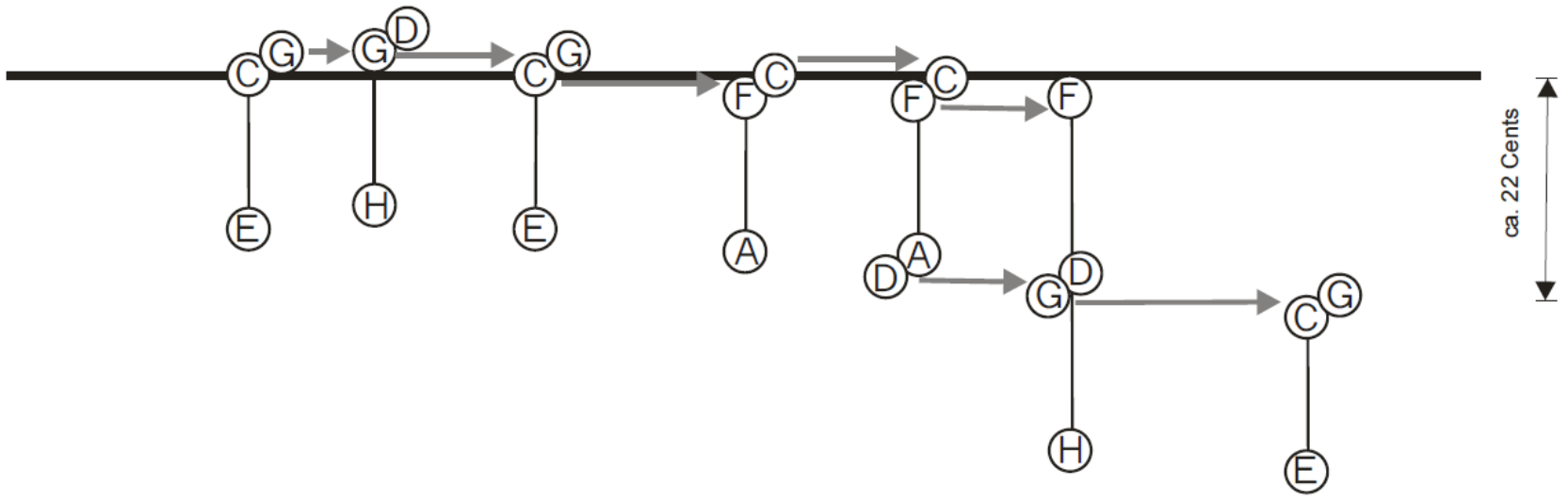
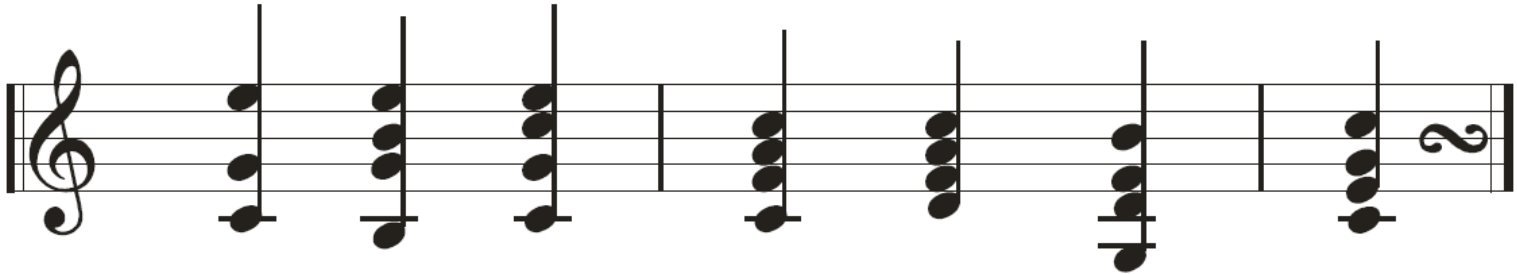
180,0Hz

240Hz

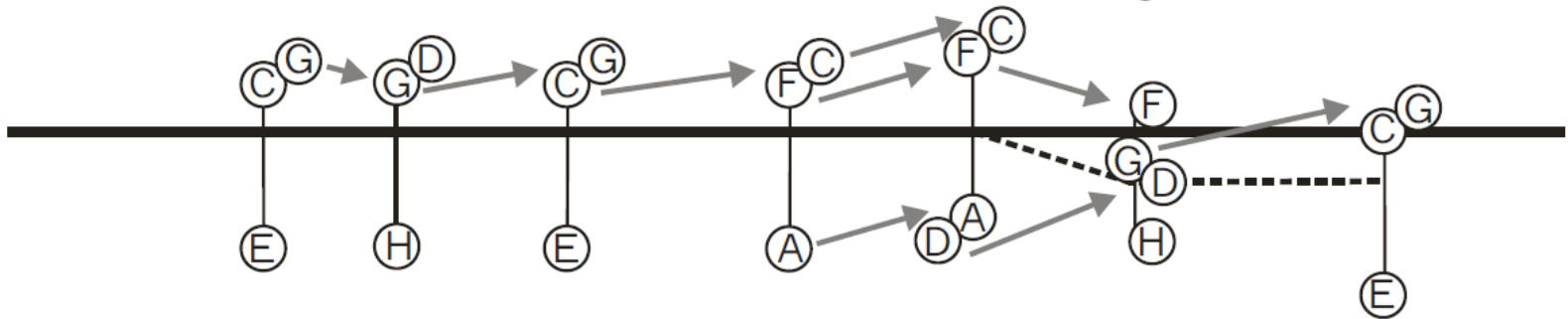
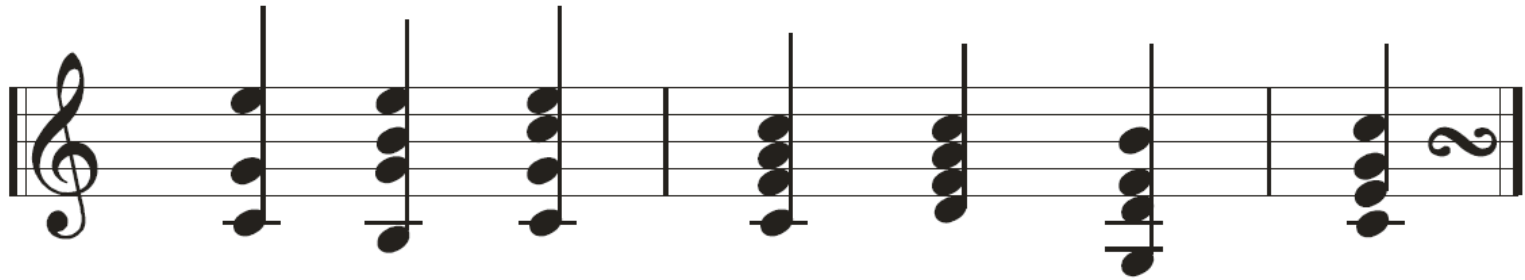
151,2Hz

179,8Hz





Intoniert wird um eine gedachte Linie



Thesen

- **Orgelmusik der Romantik ist überwiegend orchestral**
- **d.h. vor allem auch in reiner Stimmung**
- **Kompositionen rechnen nicht mehr essentiell mit den Spannungen einer temperierten Stimmung**
- **Spannung und Lösung wird auskomponiert**
- **Nicht reinen/temperierten Lösungen wird in Kauf genommen**

