

*Marc Sabat*

**Les Duressees**

*a book of music in Just Intonation*

**PLAINSOUND MUSIC EDITION**

## Les Duresses (2004–)

*for violins*

This work-in-progress is a collection of pieces for violin or violin+instrument, conceived as experimental 'intonation studies' in a sense parallel to Conlon Nancarrow's 'Studies for Player Piano'. Like Couperin's books of music for harpsichord, I think of my collection as contemporary house music existing for private playing pleasure which might occasionally double as more formal concert music. 'Les Duresses' is dedicated to Natalie Pfeiffer.

The first two pieces in the series, titled 'Intonation after Morton Feldman #1 and #2', each take as a point of departure a pair of tuned dyads drawn from Morton Feldman's unfinished 'Composition' (1984) for solo violin. The harmonically complex transitions become the respective topics of the new pieces, seeking to make these comprehensible to both player and listener. These pieces may be transposed and played on viola, Partch adapted viola, or cello if desired.

# The Extended Helmholtz-Ellis JI Pitch Notation

microtonal accidentals designed by Marc Sabat and Wolfgang von Schweinitz, 2004

## 3-LIMIT (PYTHAGOREAN) INTERVALS

♭♭    ♭    ♮    ♯    ×

## FUNCTION OF THE ACCIDENTALS

notate 35 pitches from the series of untempered perfect fifths  
 $(3/2) \approx \pm 702.0$  cents;  
*perfect fifth (3/2); perfect fourth (4/3); major wholetone (9/8)*

## 5-LIMIT (PTOLEMAIC) INTERVALS

♭♭↓    ♭↓    ♮↓    ♯↓    ×↓    ↑♭♭    ↑♭    ↑♮    ↑♯    ↑×

notate an alteration by one syntonic comma  $(81/80) \approx \pm 21.5$  cents;  
*major third (5/4); minor third (6/5); major sixth (5/3); minor sixth (8/5);  
 minor wholetone (10/9)*

♭♭↓↓    ♭↓↓    ♮↓↓    ♯↓↓    ×↓↓    ↑↑♭♭    ↑↑♭    ↑↑♮    ↑↑♯    ↑↑×

notate an alteration by two syntonic commas  
 $(81/80) \cdot (81/80) \approx \pm 43.0$  cents;  
*augmented fifth (25/16); diminished fourth (32/25)*

♭♭↓↓↓    ♭↓↓↓    ♮↓↓↓    ♯↓↓↓    ×↓↓↓    ↑↑↑♭♭    ↑↑↑♭    ↑↑↑♮    ↑↑↑♯    ↑↑↑×

notate an alteration by three syntonic commas  
 $(81/80) \cdot (81/80) \cdot (81/80) \approx \pm 64.5$  cents;  
*minor diesis (128/125)*

## 7-LIMIT (SEPTIMAL) INTERVALS

↳    ↴  
 ↳↳ or ↳↳↳    ↴↴ or ↴↴↴

notate an alteration by one septimal comma  $(64/63) \approx \pm 27.3$  cents;  
*natural seventh (7/4); septimal wholetone (8/7);  
 septimal diminished fifth (7/5); septimal tritone (10/7);  
 septimal minor third (7/6); septimal quartertone (36/35)*

notate an alteration by two septimal commas  
 $(64/63) \cdot (64/63) \approx \pm 54.5$  cents;  
*septimal sixtitone (49/48)*

## 11-LIMIT (UNDECIMAL) INTERVALS

†    †

notate an alteration by one undecimal quartertone  
 $(33/32) \approx \pm 53.3$  cents;  
*undecimal augmented fourth (11/8); undecimal diminished fifth (16/11)*

## 13-LIMIT (TRIDECIMAL) INTERVALS

‡    ‡

notate an alteration by one tridecimal thirdditone  $(27/26) \approx \pm 65.3$  cents;  
*tridecimal neutral sixth (13/8); tridecimal neutral third (16/13)*

## PRIMES IN THE HARMONIC SERIES OCTAVE 16 - 32 (5-limit signs are given here relative to "A")

⊖♭    ⊖♯

notate an alteration of the 5-limit accidental by one 17-limit schisma  
 $(16/17) \cdot (16/15) = (256/255) \approx \pm 6.8$  cents;  
*Galileo's "equal-tempered" semitone (18/17);  
 17-limit diminished seventh chord 10:12:14:17*

⊖♮    ⊖♮

notate an alteration by one 19-limit schisma  
 $(19/16) \cdot (27/32) = (513/512) \approx \pm 3.4$  cents;  
*19-limit minor third (19/16); 19-limit minor triad 16:19:24*

↑♯    ↓♭

notate an alteration by one 23-limit comma  
 $(23/16) \cdot (8/9) \cdot (8/9) \cdot (8/9) \approx \pm 16.5$  cents;  
*raised leading tone (23/12)*

↑  
♯

↓  
♯

notate an alteration of the 5-limit accidental by one 29-limit comma  
 $(29/16) \cdot (5/9) = (145/144) \approx \pm 12.0$  cents

-  
♯

+  
♯

notate an alteration of the 11-limit accidental by one 31-limit schisma  
 $(32/31) \cdot (32/33) = (1024/1023) \approx \pm 1.7$  cents

**PRIMES IN THE HARMONIC SERIES OCTAVE 32 - 64** (5-limit signs are given here relative to "A")

{  
} ↑  
♯

{  
} ↓  
♯

notate an alteration of the 11-limit accidental by one 37-limit schisma  
 $(36/37) \cdot (33/32) = (297/296) \approx \pm 5.8$  cents

{  
} ↑  
♯

{  
} ↓  
♯

notate an alteration of the 5-limit accidental by one 41-limit schisma  
 $(32/41) \cdot (81/64) \cdot (81/80) = (6561/6560) \approx \pm 0.3$  cents

{  
} ↑

{  
} ↓

notate an alteration by one 43-limit comma  
 $(43/32) \cdot (3/4) = (129/128) \approx \pm 13.5$  cents

{  
} ↑  
♯ or {  
} ↑  
♯

{  
} ↓  
♯ or {  
} ↓  
♯

notate an alteration of the 7-limit accidental by one 47-limit schisma  
 $(32/47) \cdot (48/49) \cdot (3/2) = (2304/2303) \approx \pm 0.8$  cents

{  
} ↑  
♯

{  
} ↓  
♯

notate an alteration of the 5-limit accidental by one 53-limit comma  
 $(32/53) \cdot (5/3) = (160/159) \approx \pm 10.9$  cents

{  
} ↑  
♯

{  
} ↓  
♯

notate an alteration of the 13-limit accidental by one 59-limit schisma  
 $(32/59) \cdot (24/13) = (768/767) \approx \pm 2.3$  cents

{  
} ↑  
♯

{  
} ↓  
♯

notate an alteration of the 7-limit accidental by one 61-limit schisma  
 $(61/32) \cdot (21/40) = (1281/1280) \approx \pm 1.4$  cents

**IRRATIONAL AND TEMPERED INTERVALS**

♭

♭

♯

♯

×

notate the respective Equal Tempered Semitone;  
may be combined with a cents indication to notate any pitch

**NOTE ABOUT CENTS INDICATIONS**

optional cents indications may be placed above or below the respective accidentals and are always understood in reference to Equal Tempered semitones, as implied by the Pythagorean accidentals

# 'Les Duresses' : a book of music in Just Intonation

for Natalie Pfeiffer

## No. 1 : Intonation after Morton Feldman #1 (violin solo)

Marc Sabat, 2004

814 ¢  $\boxed{8/5}$  969 ¢  $\boxed{7/4}$  498 ¢  $\boxed{4/3}$  386 ¢  $\boxed{5/4}$  2. repeat sign : entire bracket

con sordino +155 cents 32 : 35 -112 ¢ 16 : 15

1. Musical notation for the first phrase, starting with 'con sordino'. It features a treble clef and a series of chords. Above the staff, a bracket spans the first two measures, with ratios 8/5 and 7/4. Above the next two measures, a bracket spans them with ratios 4/3 and 5/4. A second instruction '2. repeat sign : entire bracket' is placed to the right. The notation includes 'port.' markings and a '2. repeat sign' at the end of the phrase.

as many bow changes and repetitions as accurate intonation requires,  
proceed continuously through the numbered phrases

653 ¢  $\boxed{35/24}$

2. Musical notation for the second phrase, starting with 'port.'. It features a treble clef and a series of chords. Above the staff, a bracket spans the first two measures with the ratio 35/24. The notation includes 'port.' markings and a repeat sign at the end of the phrase.

3. Musical notation for the third phrase, featuring a treble clef and a series of chords. The notation includes repeat signs at the beginning and end of the phrase.

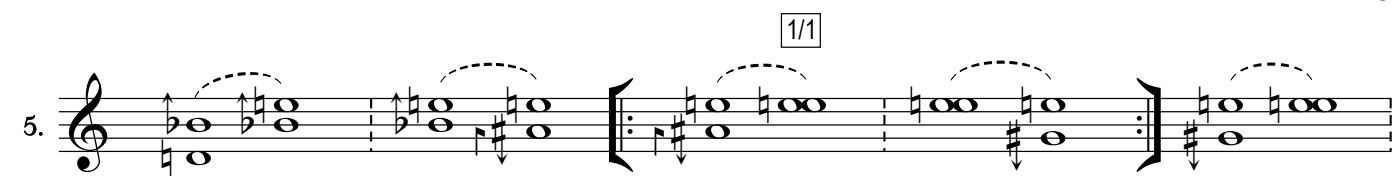
590 ¢  $\boxed{45/32}$  582.5 ¢  $\boxed{7/5}$  1. time only

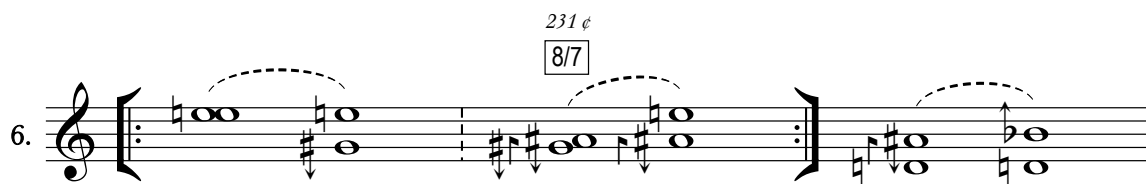
224 : 225 +8 ¢

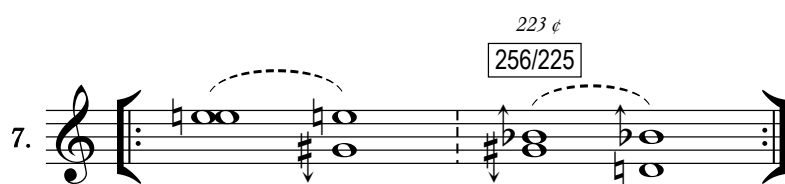
4. Musical notation for the fourth phrase, featuring a treble clef and a series of chords. Above the staff, a bracket spans the first two measures with the ratio 45/32, and another bracket spans the next two measures with the ratio 7/5. A note change is indicated between measures 224 and 225 with a '+8 ¢' adjustment. The notation includes '1. time only' and repeat signs.

821 ¢  $\boxed{45/28}$  1. time only

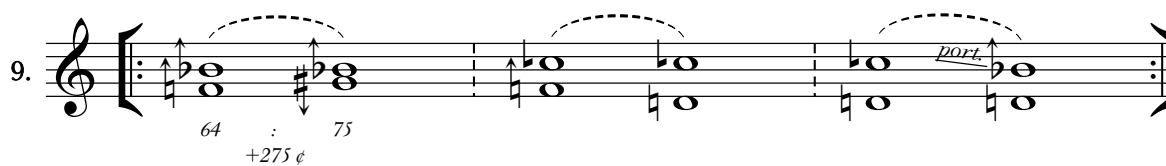
Musical notation for the fifth phrase, featuring a treble clef and a series of chords. Above the staff, a bracket spans the first two measures with the ratio 45/28. The notation includes '1. time only' and repeat signs.

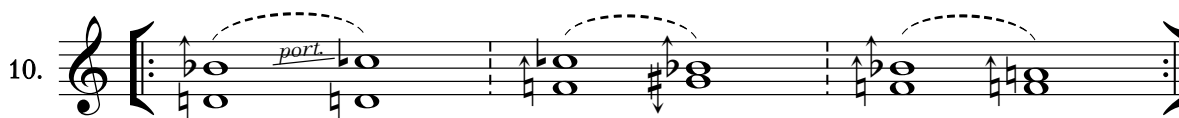
5. 

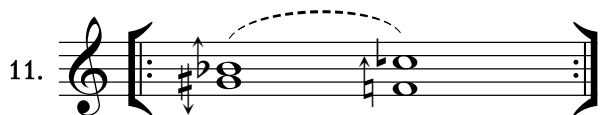
6. 

7. 

8. 

9. 

10. 

11. 

No. 2 : Intonation after Morton Feldman #2 (*violin solo*)

386  $\epsilon$  5/4                      814  $\epsilon$  8/5                      275  $\epsilon$  75/64

con sordino                      sempre simile

as many bow changes and repetitions (at least 3) of each interval as accurate intonation requires;  
 "loure" stroke with several articulations in one bow; repeat segments under square brackets as desired

498  $\epsilon$  4/3                      267  $\epsilon$  7/6                      379  $\epsilon$  56:45

582.5  $\epsilon$  7/5

617.5  $\epsilon$  10/7                      506  $\epsilon$  75/56                      590  $\epsilon$  45/32

884  $\epsilon$  5/3                      969  $\epsilon$  7/4                      1018  $\epsilon$  9/5

20                      +84.5  $\epsilon$                       21

1173  $\epsilon$  63/32

541.5 ¢ 175:128      316 ¢ 6/5      1200 ¢ 2/1

1178 ¢ 160/81

1067 ¢ 50/27      1049 ¢ 11/6      547.2 ¢ 1000:729      612 ¢ 729:512

100 : 99      55 : 54

-17 ¢      -32 ¢

12/7

41 ¢ 128/125      231 ¢ 8/7      546.8 ¢ 48/35

49 ¢ 36/35      551.3 ¢ 11/8

540 : 539

225 : 224

-3 ¢      -8 ¢

1045 ¢ 64/35



No. 3 : Two Commas (*violin solo*)

con sordino

5/3 8/5 81/64 5/4 27/16 81 : 80 -21.5¢ 81/50

80 : 81 +21.5¢

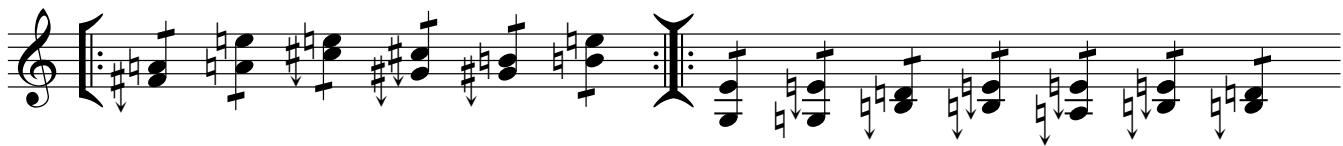
*repeat each double-stop 2 or 3 times as indicated, and each pattern 2 or 3 times as desired; tune as accurately as possible whilst maintaining a lively brisk tempo*

27/20 4/3 7/4 9/7 9/5

35 : 36 +49¢

3/2

81/40 6/5



Skhisma  
-2¢  
----->  
32805 : 32768



Octave (2:1) + Ptolemaic (Syntonic) Comma (81:80)

Octave (2:1) + Pythagorean Comma (531441:524288)

+2¢  
----->  
32768 : 32805



-2¢  
----->  
32805 : 32768



32805 : 32768  
----->  
-2¢



## No. 4 : Duas Quintas (2 violins)

con sordino, legato sempre

35

24

con sordino, legato sempre

*events which are connected by dotted lines are to be co-ordinated as indicated, otherwise played freely; boxed numbers refer to the harmonic series numbers over a low G0 (3 octaves below the G string)*

36

The image shows a musical score for two staves, likely a piano and a violin or flute. The score is divided into several systems. The first system consists of two staves with various notes and rests. The second system also has two staves, with a measure number '25' in a box above the second staff. Below the first staff of this system is the instruction *un poco più forte*. The third system has two staves, with a measure number '37' in a box above the first staff. Below the first staff of this system is the instruction *number of repetitions always ad libitum*. The score includes various musical notations such as notes, rests, slurs, and dynamic markings. There are also some annotations in parentheses, such as '(25)' and '(12)', which likely refer to the number of repetitions of a specific phrase. The score is written in a standard musical notation style with a treble clef for the upper staff and a bass clef for the lower staff.

This musical score is written for guitar and consists of six systems of two staves each. The notation includes various musical symbols such as notes, rests, and accidentals. Fret numbers (III, IV, I, II, III) are indicated above the notes. Measure numbers (110, 111, 121, 125, 147, 148) are placed above or below the notes. Performance markings include slurs, ties, and dynamic markings like  $+16 \epsilon$  and  $+12 \epsilon$ . A section of the score is labeled "(repeated phrase continues)".

-16 e  
111 : 110

First system of musical notation. Treble clef. Measure 111 contains a triplet of eighth notes with a circled '5' above it. Measure 110 contains a circled '3' below it. Measure 112 contains a circled '(22)' above it. Measure 113 contains a circled '(15)' below it. The system includes various musical symbols such as slurs, ties, and accidentals.

Second system of musical notation. Treble clef. Measure 114 contains a circled '(37)' above it. The system includes various musical symbols such as slurs, ties, and accidentals.

Third system of musical notation. Treble clef. Measure 115 contains a circled '26' below it. The system includes various musical symbols such as slurs, ties, and accidentals.

Fourth system of musical notation. Treble clef. Measure 116 contains a circled '(24)' above it and a circled '(13)' below it. Measure 117 contains a circled '(37)' above it. Measure 118 contains a circled '111' above it and a circled '112' above it. Measure 119 contains a circled '111' above it and a circled '112' above it. Measure 120 contains a circled '111' above it and a circled '112' above it. The system includes various musical symbols such as slurs, ties, and accidentals.

Fifth system of musical notation. Treble clef. Measure 121 contains a circled 'III (10)' above it. Measure 122 contains a circled 'II (9)' above it. The system includes various musical symbols such as slurs, ties, and accidentals.

Sixth system of musical notation. Treble clef. Measure 123 contains a circled '38' above it and a circled '(19)' below it. Measure 124 contains a circled '(19)' below it. Measure 125 contains a circled '(19)' below it. Measure 126 contains a circled '(19)' below it. Measure 127 contains a circled '(19)' below it. Measure 128 contains a circled '(19)' below it. Measure 129 contains a circled '(19)' below it. Measure 130 contains a circled '(19)' below it. The system includes various musical symbols such as slurs, ties, and accidentals.

First system of musical notation. It consists of two staves. The upper staff contains a melodic line with several measures, including a measure with a flat sign (b) and a measure with a fermata. The lower staff contains a bass line with a wavy line indicating a tremolo or similar effect.

Second system of musical notation. It consists of two staves. The upper staff has a measure with a flat sign (b) and a measure with a fermata. The lower staff has a measure with a flat sign (b) and a measure with a fermata. There are Roman numerals II and III above the upper staff, and (15) and (19) next to notes. A measure in the lower staff is marked with (4).

Third system of musical notation. It consists of two staves. The upper staff has a measure with a flat sign (b) and a measure with a fermata. The lower staff has a measure with a flat sign (b) and a measure with a fermata. There are Roman numerals II and III above the upper staff.

Fourth system of musical notation. It consists of two staves. The upper staff has a measure with a flat sign (b) and a measure with a fermata. The lower staff has a measure with a flat sign (b) and a measure with a fermata. There are Roman numerals III and IV above the lower staff. A dashed line connects a note in the upper staff to a note in the lower staff. Measures are marked with (13) and (6).

Fifth system of musical notation. It consists of two staves. The upper staff has a measure with a flat sign (b) and a measure with a fermata. The lower staff has a measure with a flat sign (b) and a measure with a fermata. There is a dashed line in the lower staff.

Sixth system of musical notation. It consists of two staves. The upper staff has a measure with a flat sign (b) and a measure with a fermata. The lower staff has a measure with a flat sign (b) and a measure with a fermata.

First system of musical notation. The upper staff contains a melodic line with notes marked with circled numbers (7), (12), and (19). The lower staff provides a harmonic accompaniment with chords and moving lines.

Second system of musical notation. The upper staff continues the melody with a flat sign (b) above a note. The lower staff includes the instruction *più calmo* and a fermata over a chord. A double bar line with a repeat sign is present.

Third system of musical notation. The upper staff features a circled number 39 above a measure. The lower staff includes a circled number 27 above a measure. Dashed lines connect notes between the two staves, indicating a specific relationship or interval.

Fourth system of musical notation. The upper staff continues the melodic line. The lower staff features a fermata over a chord and a double bar line with a repeat sign.

Fifth system of musical notation. The upper staff continues the melody. The lower staff includes a fermata over a chord and a double bar line with a repeat sign. Roman numerals II and III are placed below the staff.

Sixth system of musical notation. The upper staff continues the melody. The lower staff includes a fermata over a chord and a double bar line with a repeat sign. Roman numerals II and III are placed below the staff.



First system of musical notation. The upper staff contains a melodic line with a half note, a quarter note, and a dotted quarter note. The lower staff contains a bass line with a half note, a quarter note, and a dotted quarter note. Fingering numbers II and III are indicated below the lower staff.

Second system of musical notation. The upper staff contains a melodic line with a half note, a quarter note, and a dotted quarter note. The lower staff contains a bass line with a half note, a quarter note, and a dotted quarter note. Fingering numbers I and I are indicated below the lower staff.

Third system of musical notation. The upper staff contains a melodic line with a half note, a quarter note, and a dotted quarter note. The lower staff contains a bass line with a half note, a quarter note, and a dotted quarter note. Fingering number I is indicated below the lower staff.

Fourth system of musical notation. The upper staff contains a melodic line with a half note, a quarter note, and a dotted quarter note. The lower staff contains a bass line with a half note, a quarter note, and a dotted quarter note. Fingering numbers H and H are indicated below the lower staff.

Fifth system of musical notation. The upper staff contains a melodic line with a half note, a quarter note, and a dotted quarter note. The lower staff contains a bass line with a half note, a quarter note, and a dotted quarter note. Fingering numbers I and I are indicated below the lower staff.

Sixth system of musical notation. The upper staff contains a melodic line with a half note, a quarter note, and a dotted quarter note. The lower staff contains a bass line with a half note, a quarter note, and a dotted quarter note. Fingering numbers H and I are indicated below the lower staff.

First system of musical notation. The upper staff contains a melodic line with eighth and sixteenth notes, some beamed together, and a final comma. The lower staff contains a bass line with chords and fingerings: I, II, II, II, I.

Second system of musical notation. The upper staff has a few notes with a comma. The lower staff has a melodic line with fingerings: I, I, II, III, III.

Third system of musical notation. The upper staff has a melodic line with a repeat sign and a wavy line at the end. The lower staff has a bass line with fingerings: III, I, I, I.

Fourth system of musical notation. The upper staff is mostly empty with a wavy line. The lower staff has a melodic line with fingerings: II, III, III, III.

Fifth system of musical notation. The upper staff has a melodic line with a dashed line leading to a comma. The lower staff has a bass line with fingerings: I, I, I, II, II.