seeds and ledgers 1–3

for string quartet

dedicated to lucie, cat, and ira, respectively

michael winter
(berlin and cdmx; 2023–2024)

notes **1**

seeds and ledgers 1 . . . . . **3**

seeds and ledgers 2 . . . . . **14**

seeds and ledgers 3 . . . . . **20**

Description (which can optionally be used/adapted as a program note)

seeds and ledgers 1–3 explore the reconciliation of distance in harmonic space, generally referred to as 'consonance' or 'dissonance', and melodic movement in pitch space, generally referred as a difference in 'height'. Distance in harmonic space is measured as a complexity function on the frequency ratio between two tones: the higher the quantity and size of the prime factors needed to express the numbers in the frequency ratio, the more dissonant the relationship. Distance in pitch space is typically measured as the log of a frequency ratio and is often expressed in semitones or cents (100th of a tempered semitone). For example, the perfect 5th (a frequency ratio of 3/2) is one of the closest intervals in harmonic space but relatively far (7 semitones) in pitch space. On the contrary, tones that are distance in harmonic space often represent smaller melodic and chromatic differences/movements in pitch space.

These pieces were generated using custom software that maintains 'compact sets' (consonant groups of tones) in harmonic space among any simultaneously sounding tones, but favors smaller steps when one voice moves melodically. This is essentially a sort of 'voice leading', which is a term often used in the tradition of western classical music.

A compact set is defined as a group of notes such that each note in the group is close in harmonic space to some other note in the group. But when one voice moves, the program will favor notes that move by a smaller step in pitch space from itself while transitioning to another compact set among all the tones.

Any individual part would be near impossible to play by itself. However, because compact sets are always maintained, each successive tone within a part can always be tuned via a relatively simple interval in harmonic space to a tone that is already sounding in one of the other instruments. As a result of this process, some of the passages have an almost baroque, contrapuntal feel; a chromatic drift in harmonic space constantly modulating.

Tuning

Each written note indicates the closest pitch in twelve-tone equal temperament with a cents-deviation (100th of a tempered semitone) provided above.

A Roman numeral with an Arabic superscript followed by an up or down arrow is most often provided below each note. The Roman numeral indicates the reference part against which the current note (which will be called the *referencing note* from here on) can be tuned by a relatively simple interval from a recently or currently sounding pitch in the reference part (which will be called the *reference pitch* from here on). The Arabic superscript and the corresponding arrow indicate the exact interval, up or down, of the referencing note from the reference pitch. Generally, the reference pitch is initiated prior and continues to sound when it is referenced. Occasionally, the reference pitch terminates in the beat prior to the initiation of the referencing note. As a courtesy, this is indicated by a '<' preceding the Roman numeral below the referencing note.

No indication below a note means that it is the same pitch as the prior note within the respective part.

A Roman numeral with a superscript of 1 below a referencing note means that it is an octave equivalent of the reference pitch.

A Roman Numeral with a superscript of 3, 5, 7, 11, or 13 followed by an up arrow indicates that the pitch of the referencing note is a frequency ratio of a 3/2, 5/4, 7/4, 11/8 or 13/8, respectively, from the reference pitch if the reference pitch were transposed to the nearest octave *below* the pitch of the referencing note.

A Roman Numeral with a superscript of 3, 5, 7, 11, or 13 followed by a down arrow indicates that the pitch of the referencing note is a frequency ratio of a 2/3, 4/5, 4/7, 8/11 or 8/13, respectively, from the reference pitch if the reference pitch were transposed to the nearest octave *above* the pitch of the referencing note. That is, the down arrow is the inversion of an up arrow and it could alternatively be understood that the referencing note is a frequency ratio of 4/3, 8/5, 8/7, 16/11, or 16/13, respectively, from the reference pitch if the reference pitch were transposed to the nearest octave *below* the pitch of the referencing note.

Tempo and Duration

Each of the pieces may be played individually, but it is preferred that they are all played together in sequence.

Pieces 1 and 2 are written with a 2/2 time signature and should be played at a tempo such that a half note is approximately 60 beats per minute (2 seconds per measure).

A fermata with a number directly below is a suggestion for the number of seconds the notes in that measure can be held. It is actually the exact number of seconds that the computer program that generated the piece assigned to the measure, but may be interpreted more freely by the ensemble.

Piece 3 is much more open. Note durations are not provided until measure 105. Up until measure 105, durations between the initiation of one note to the next among the parts should generally be 1 to 2 seconds. However, that is more of a lower limit. The performer initiating the next note has discretion to maintain the current chord for (potentially much) longer such that the more consonant the chord subjectively, the longer it sounds. Within a part, each tone should generally be held until the next tone, but the given performer can also fade out and rest a moment before initiating the next tone.

Time signatures and note durations are only provided for the end of piece 3 (measures 105 to 114) and an optional coda (starting at measure 115). Like pieces 1 and 2, the ending and the coda of piece 3 should be interpreted with a tempo such that a half note is approximately 60 beats per minute.

Optional Coda

Given that the coda of piece 3 starting at measure 115 is exceedingly difficult, it is optional. Good luck to any group that attempts it and congratulations in advance to any group who successfully executes it!

Generating programs

These pieces were generated using custom software written in SuperCollider with a front-end user interface written in Javascript called Open Stage Control. These programs can also be used to audition the pieces and each individual part. The most recent version of the code along with any utilities that are developed are downloadable from a git repository at: `https://unboundedpress.org/code/mwinter/seeds_and_ledgers`

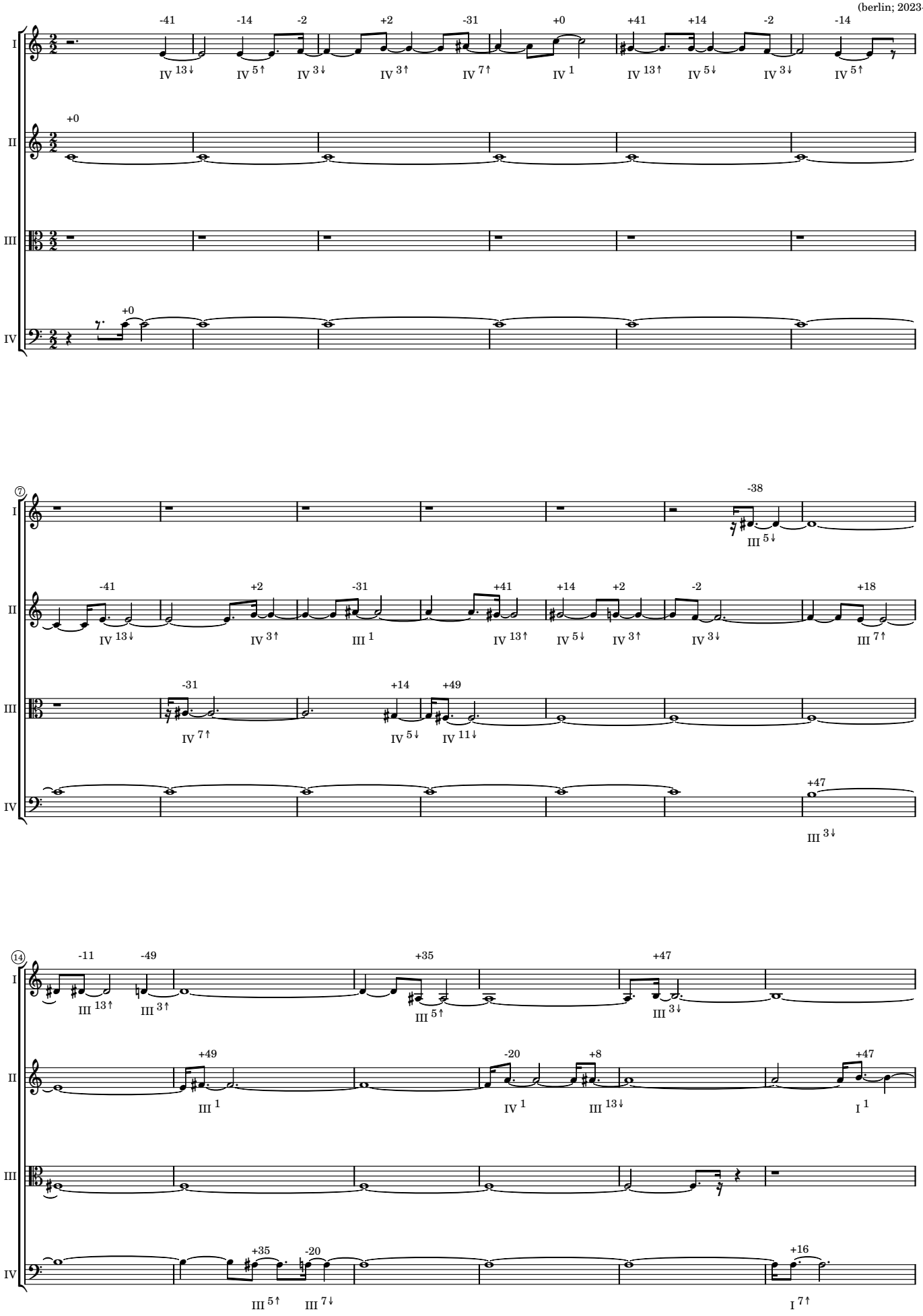
The generation of this document (using LaTex) contains a version date at the bottom of this page in order to help track changes and the git repository will also detail commit changes. The piece was last generated using SuperCollider version 3.13 and Lilypond version 2.24.1.

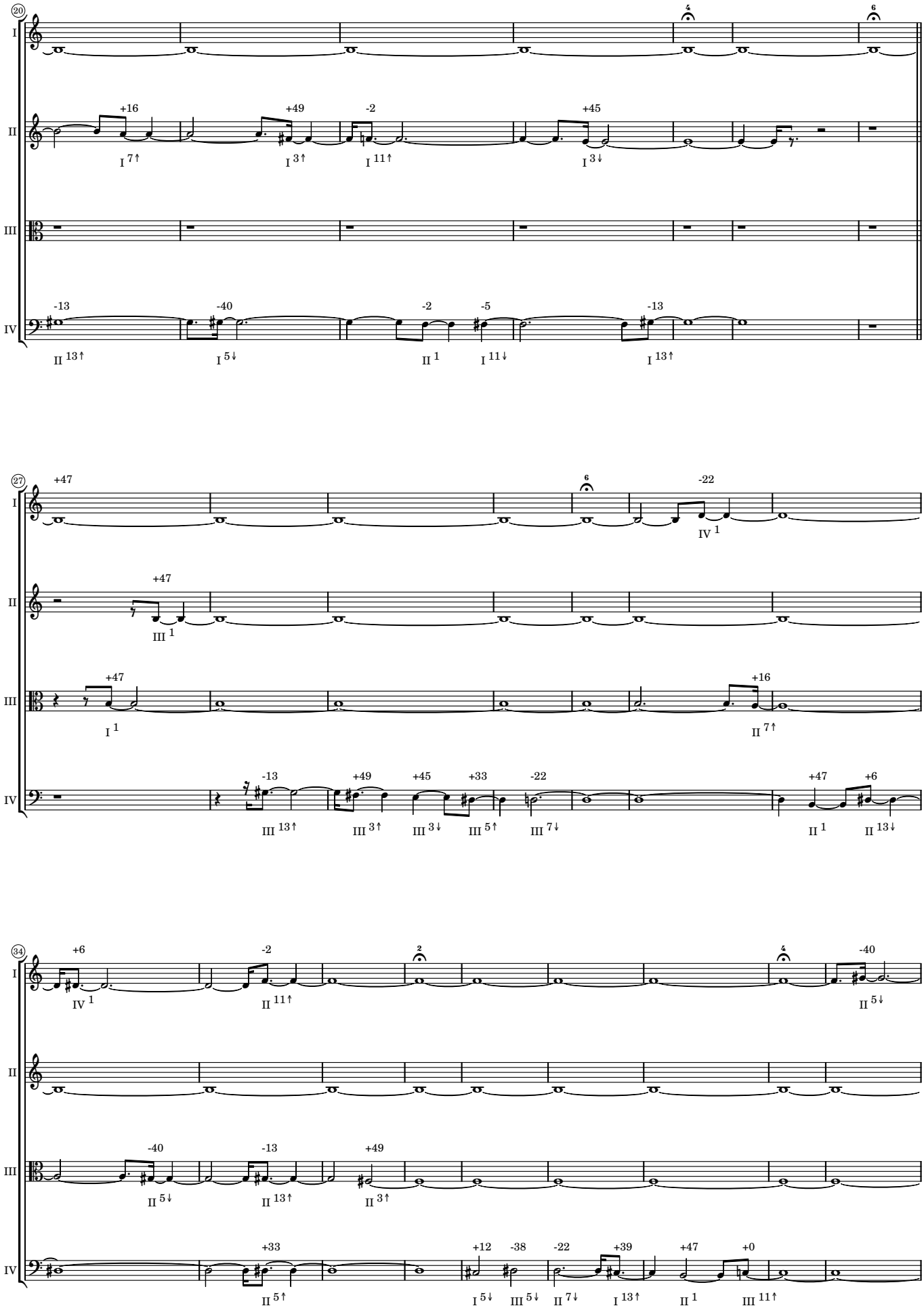
version generated: 2024.03.07

seeds and ledgers 1

for lucie nezri

michael winter
(berlin; 2023-24)

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III
IV
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-40
-2
-5
-13
27
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-22
+47
+16
+47
-13
+49
+45
+33
-22
+47
+6
34
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-40
-40
-13
+49
+33
+12
-38
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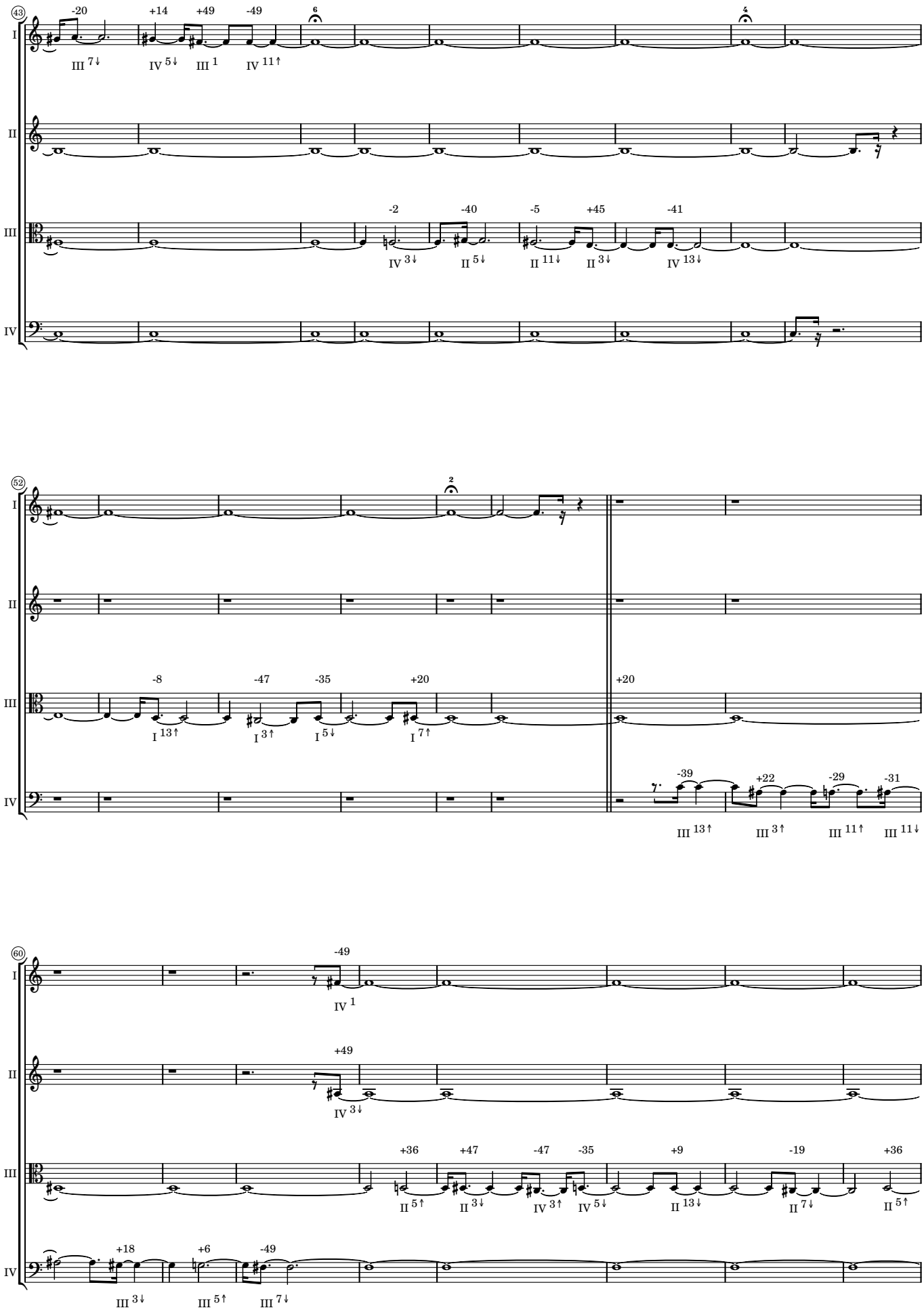
+39
+47
+0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IV
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-49
6
4
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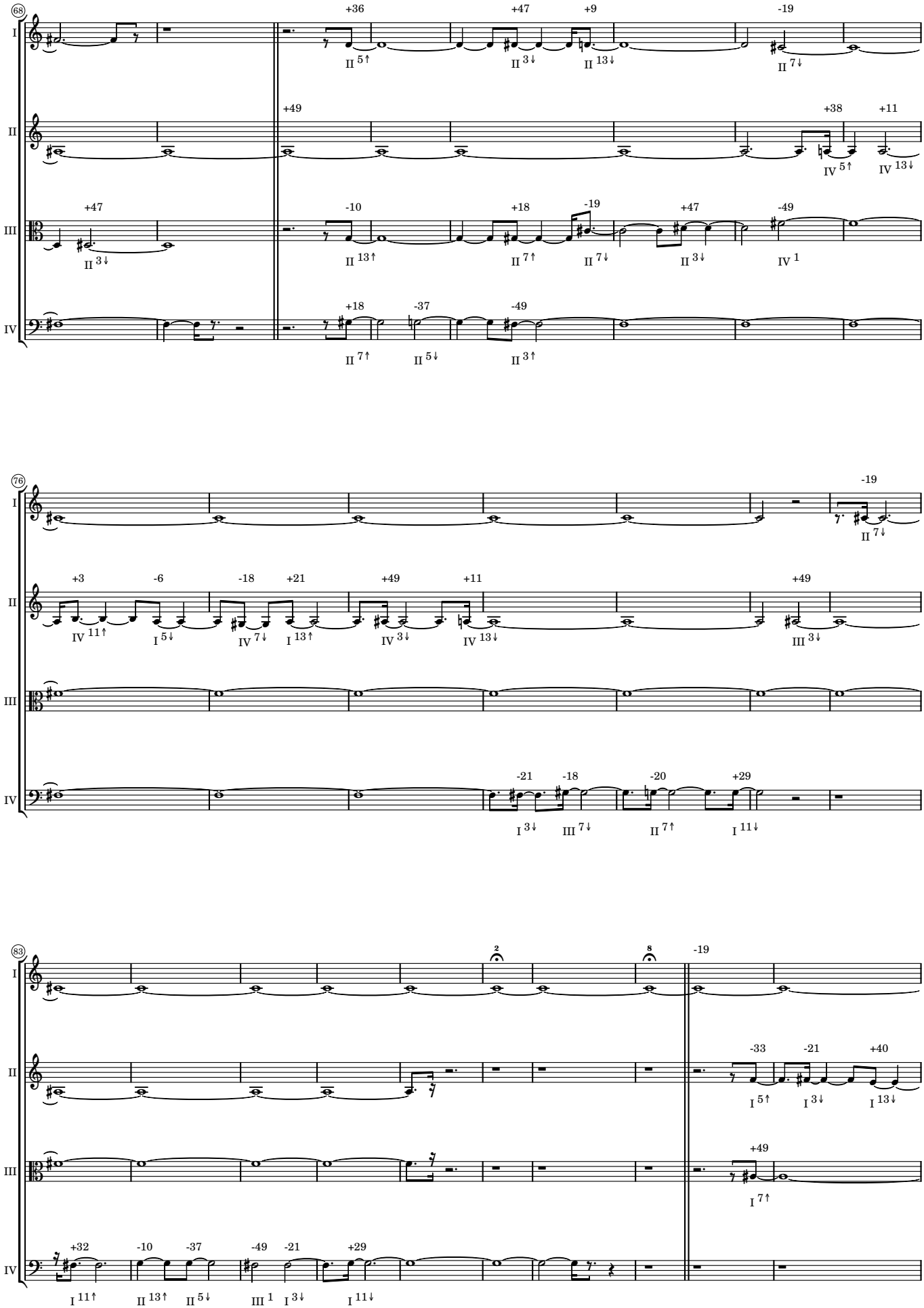
IV 5↓
III 1
IV 11↑
-2
-40
-5
+45
-41
IV 3↓
II 5↓
II 11↓
II 3↓
IV 13↓
52
2
-8
-47
-35
+20
+20
I 13↑
I 3↑
I 5↓
I 7↑
-39
+22
-29
-31
III 13↑
III 3↑
III 11↑
III 11↓
60
-49
IV 1
+49
IV 3↓
+36
+47
-47
-35
+9
-19
+36
II 5↑
II 3↓
IV 3↑
IV 5↓
II 13↓
II 7↓
II 5↑
+18
+6
-49
III 3↓
III 5↑
III 7↓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III
IV
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+38
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+47
-49
+18
-37
-49
76
-19
+3
-6
-18
+21
+49
+11
+49
-21
-18
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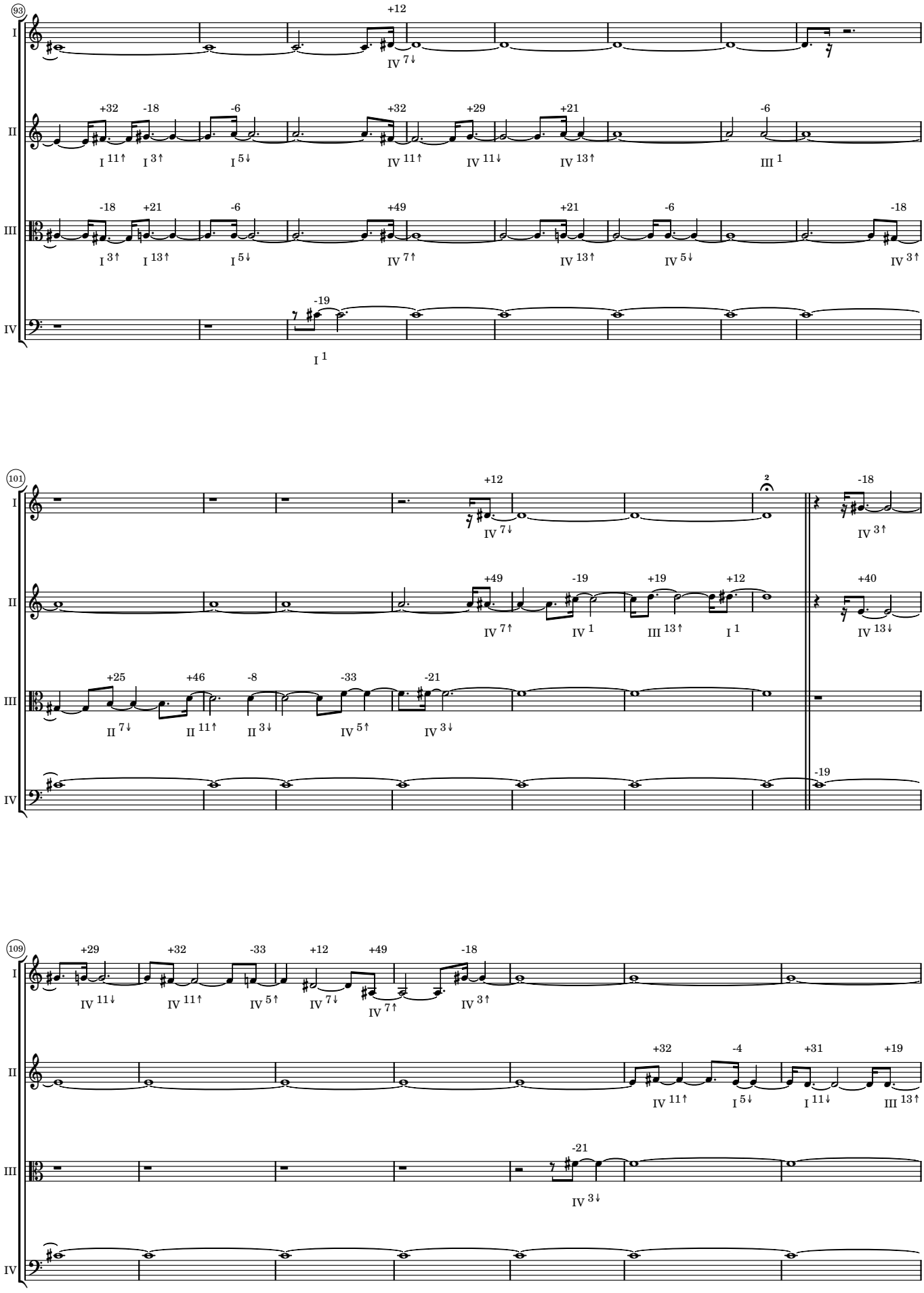
-49
-21
+29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III
IV
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-18
-6
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-6
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I 3↑
I 5↓
IV 11↑
IV 11↓
IV 13↑
III 1
-18
+21
-6
+49
+21
-6
-18
I 3↑
I 13↑
I 5↓
IV 7↑
IV 13↑
IV 5↓
IV 3↑
-19
I 1
101
+12
IV 7↓
-18
IV 3↑
+49
-19
+19
+12
+40
IV 7↑
IV 1
III 13↑
I 1
IV 13↓
+25
+46
-8
-33
-21
II 7↓
II 11↑
II 3↓
IV 5↑
IV 3↓
-19
109
+29
+32
-33
+12
+49
-18
IV 11↓
IV 11↑
IV 5↑
IV 7↓
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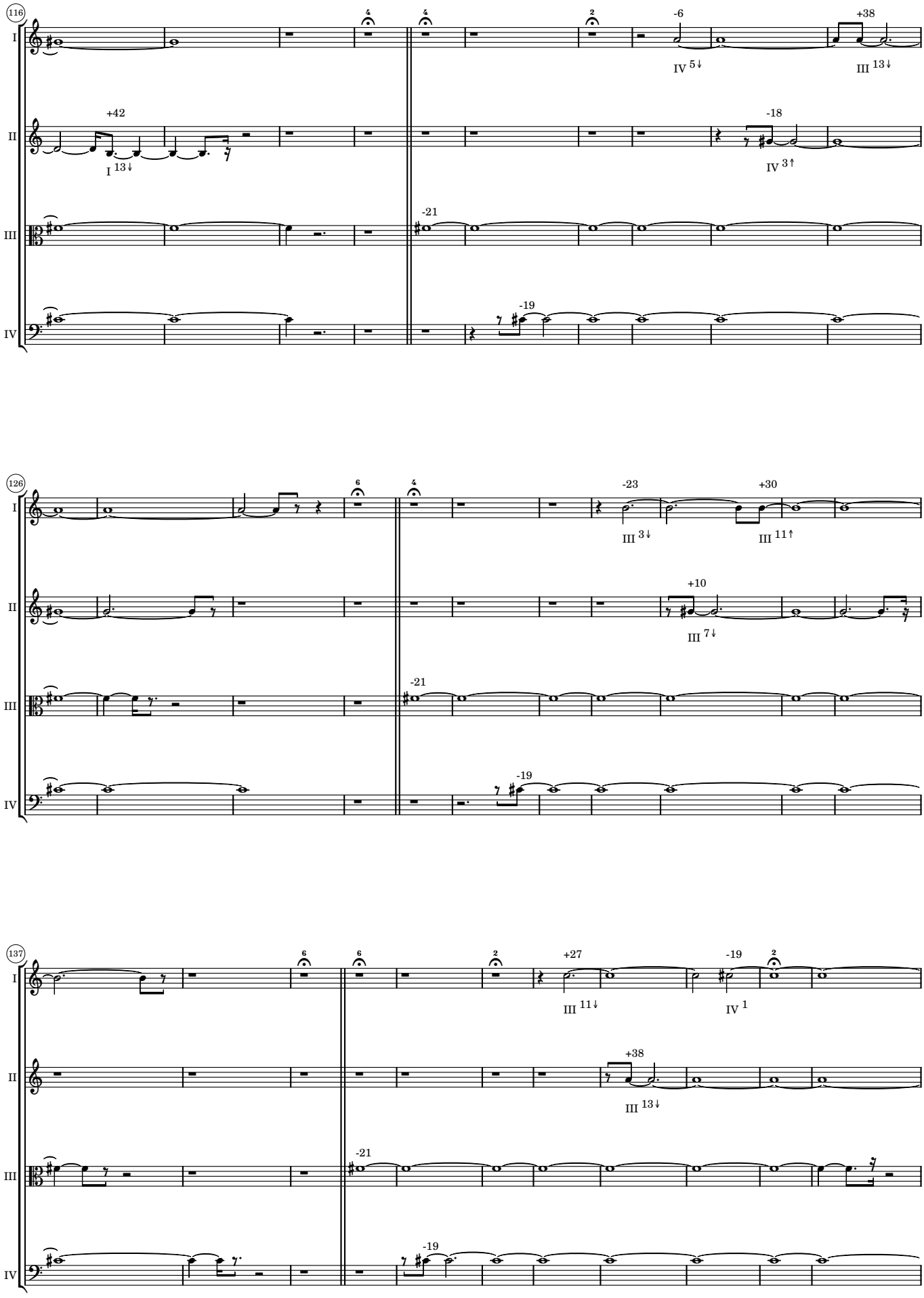
I 5↓
I 11↓
III 13↑
-21
IV 3↓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III
IV
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-6
IV 5↓
+38
III 13↓
-18
IV 3↑
-21
-19
126
-23
III 3↓
+30
III 11↑
+10
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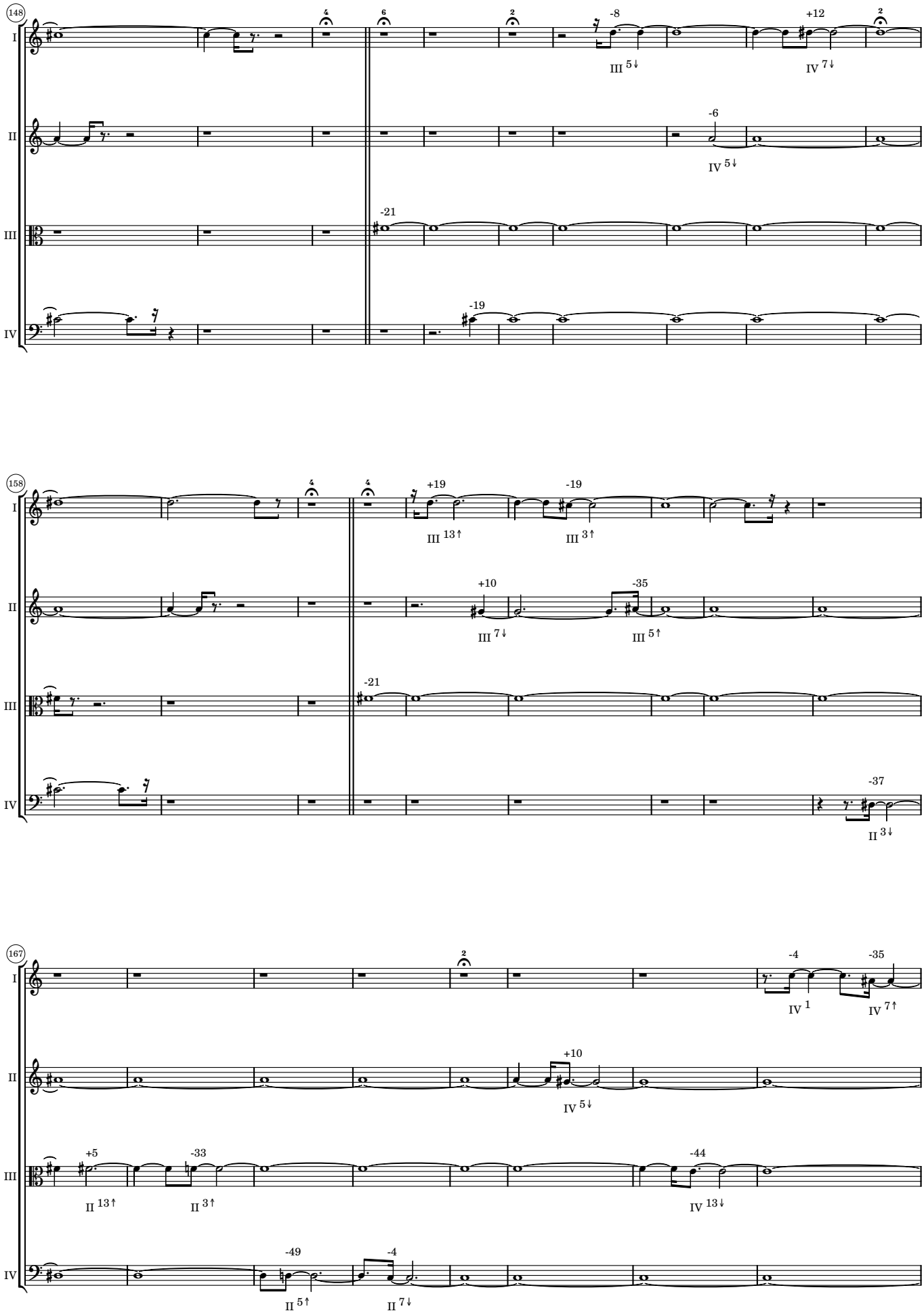
-21
-19
137
+27
III 11↓
-19
IV 1
+38
III 13↓
-21
-19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-6
IV 5↓
-21
-19
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III 13↑
-19
III 3↑
+10
III 7↓
-35
III 5↑
-21
-37
II 3↓
167
-4
IV 1
-35
IV 7↑
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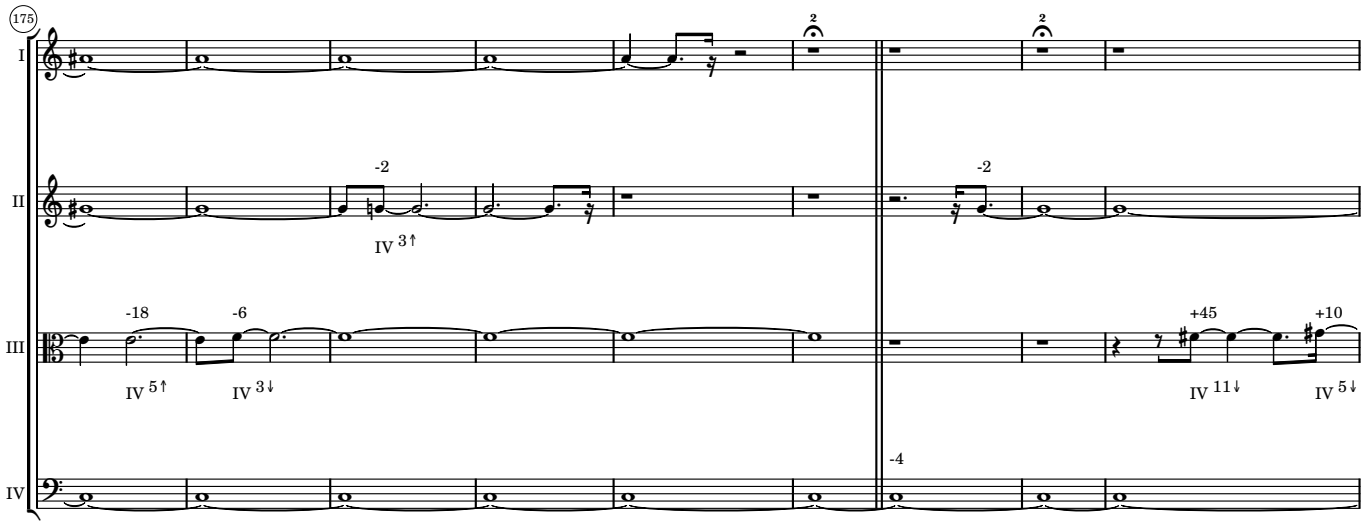
-49
II 5↑
-4
II 7↓


175
I
II
III
IV
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-18
-6
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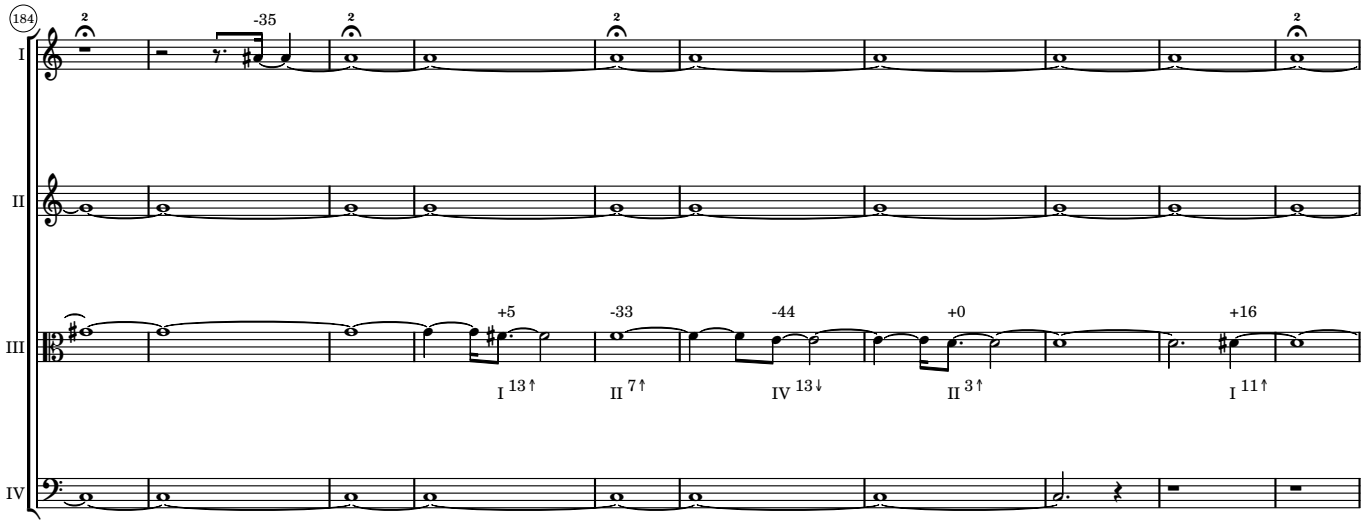
-2
+45
+10
IV 11↓
IV 5↓
-4


184
I
II
III
IV
-35
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-33
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+16
I 13↑
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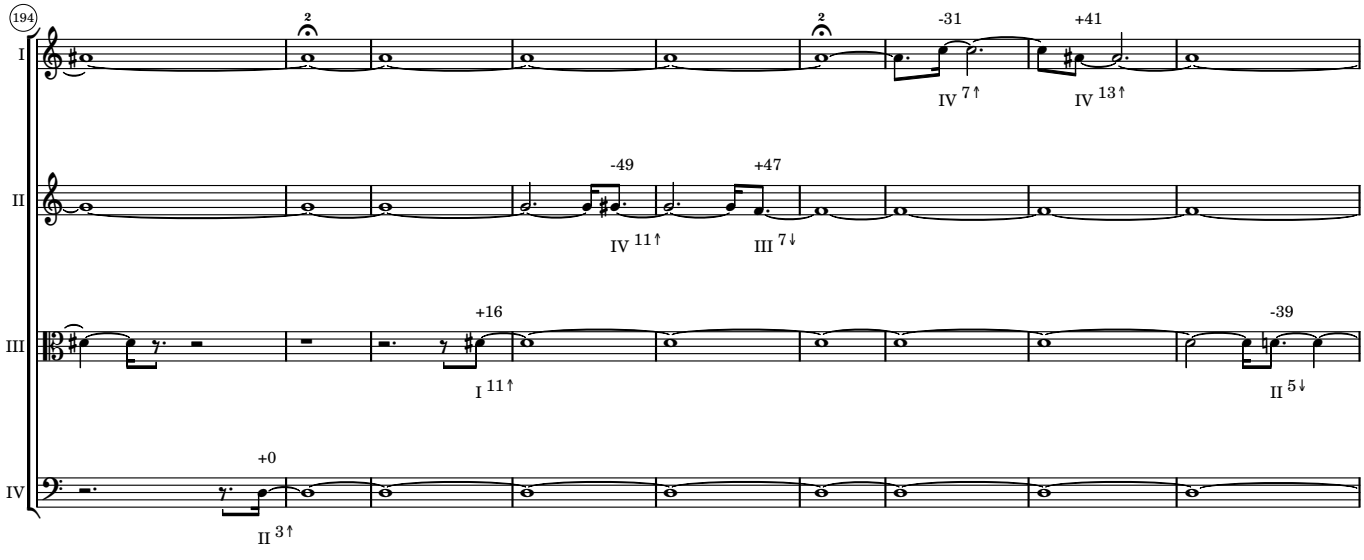
II 3↑
I 11↑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II
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-39
I 11↑
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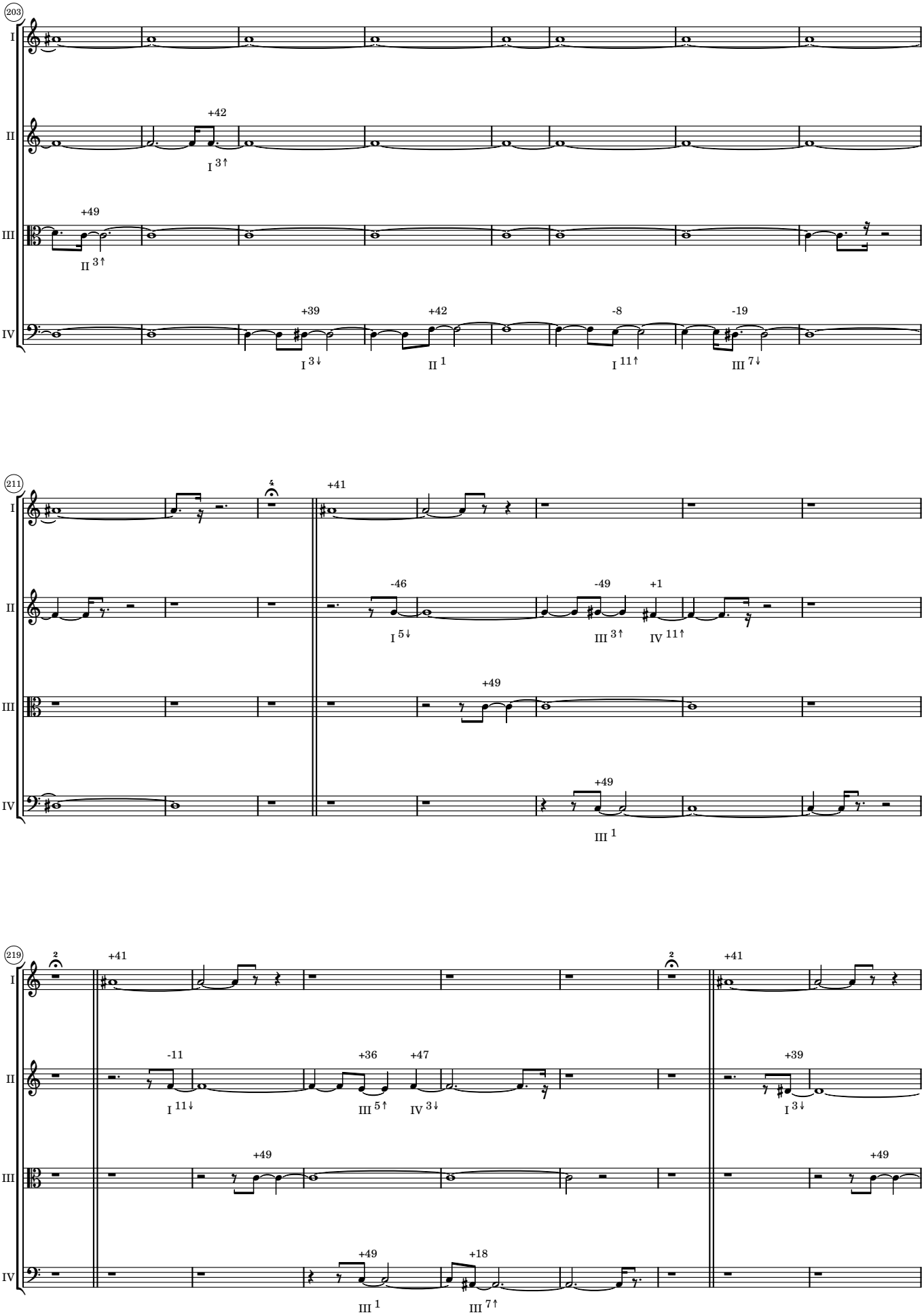
+0
II 3↑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IV
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+49
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+39
I 3↓
+42
II 1
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I 11↑
-19
III 7↓
211
4
+41
-46
I 5↓
-49
III 3↑
+1
IV 11↑
+49
III 1
219
2
+41
-11
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+49
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III 1
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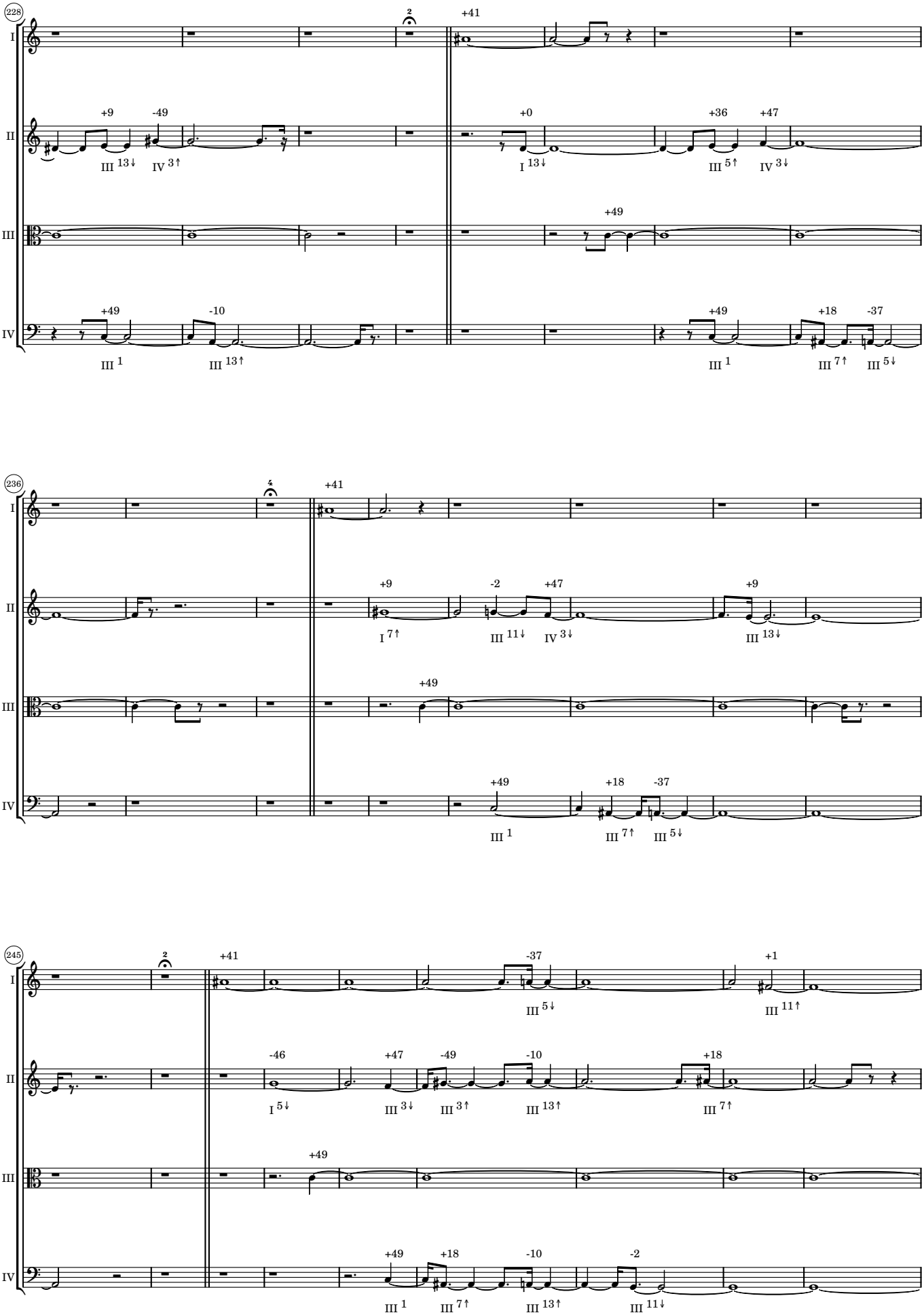
III 7↑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+49
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+49
+18
-37
III 13↓
IV 3↑
I 13↓
III 5↑
IV 3↓
III 1
III 13↑
III 1
III 7↑
III 5↓
236
4
+41
+9
-2
+47
+9
+49
+49
+18
-37
I 7↑
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IV 3↓
III 13↓
III 1
III 7↑
III 5↓
245
2
+41
-37
+1
-46
+47
-49
-10
+18
+49
+49
+18
-10
-2
III 5↓
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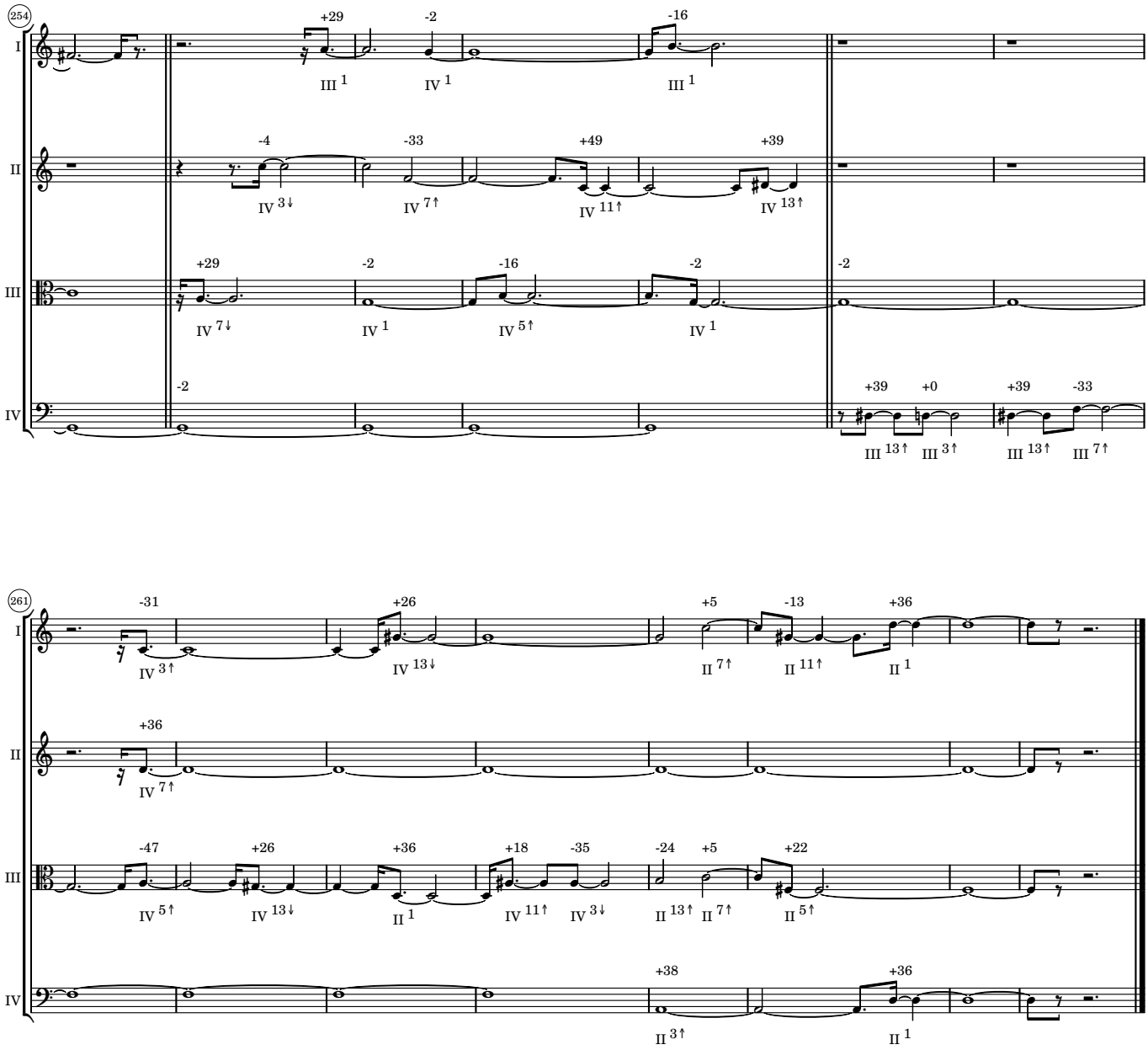
III 13↑
III 11↓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+49
+39
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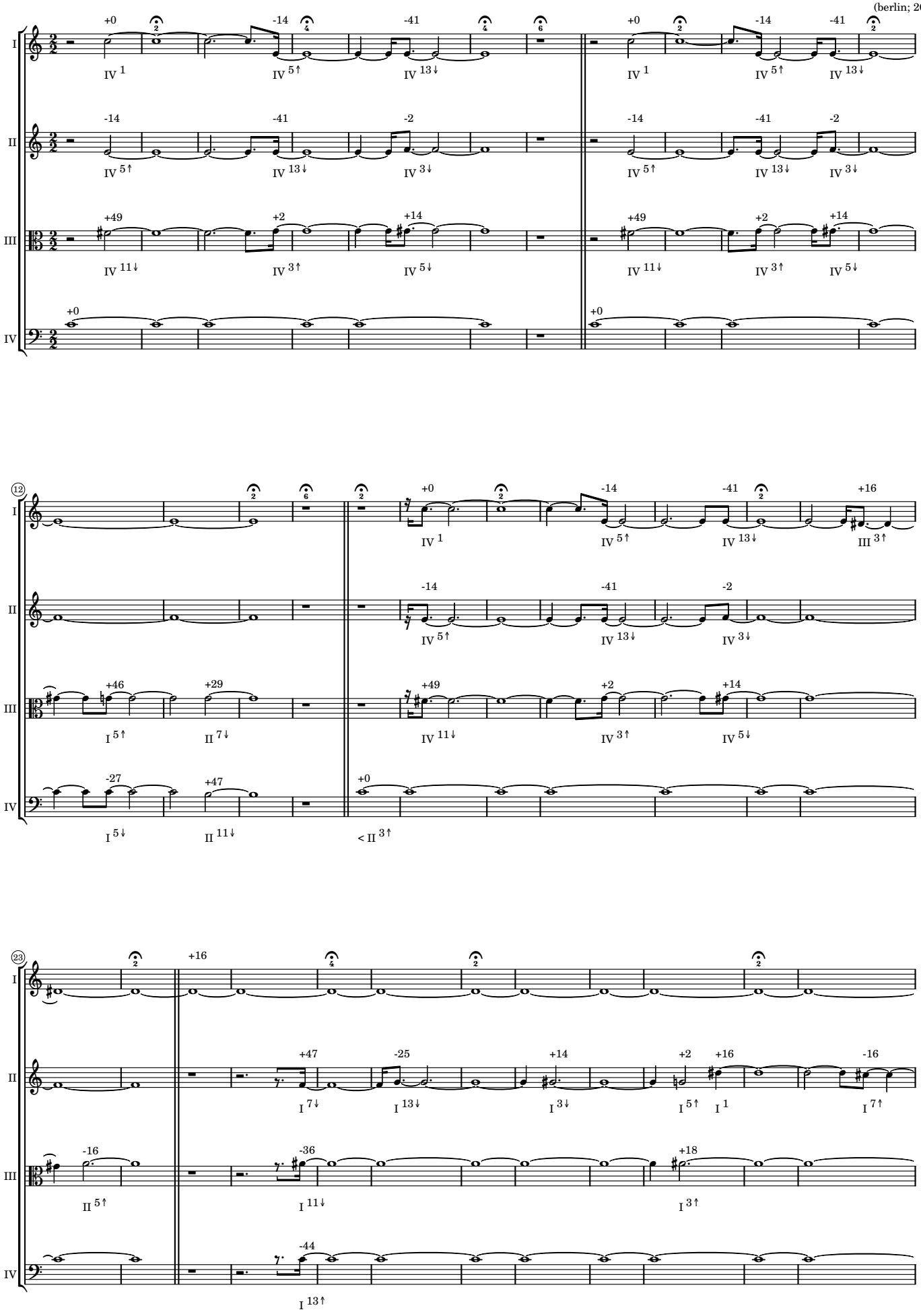
IV 7↑
IV 11↑
IV 13↑
+29
-2
-16
-2
-2
IV 7↓
IV 1
IV 5↑
IV 1
-2
+39
+0
+39
-33
III 13↑
III 3↑
III 13↑
III 7↑

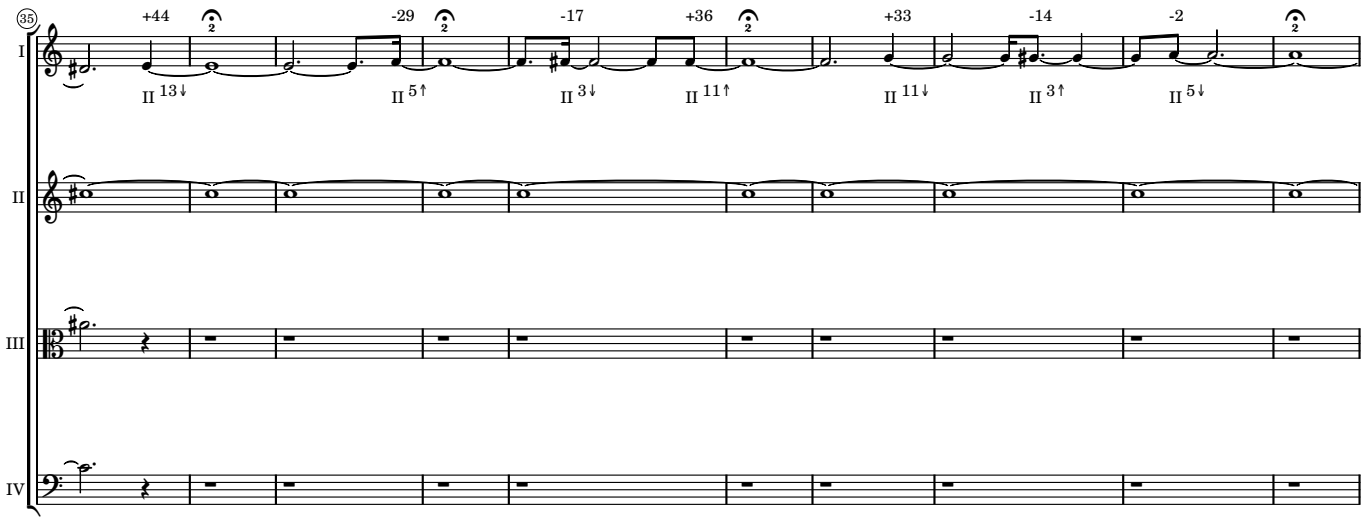
261
I
II
III
IV
-31
+26
+5
-13
+36
IV 3↑
IV 13↓
II 7↑
II 11↑
II 1
+36
IV 7↑
-47
+26
+36
+18
-35
-24
+5
+22
IV 5↑
IV 13↓
II 1
IV 11↑
IV 3↓
II 13↑
II 7↑
II 5↑
+38
+36
II 3↑
II 1

seeds and ledgers 2

for cat lamb

michael winter
(berlin; 2023)

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IV
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-29
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+36
+33
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-2
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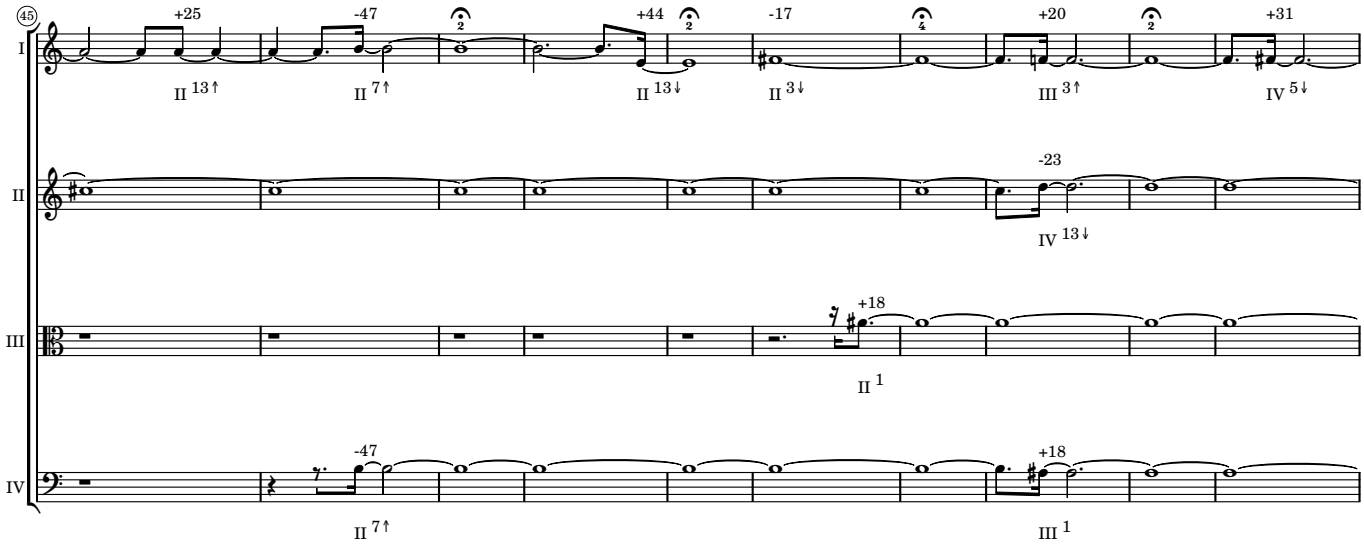
II 11↑
II 11↓
II 3↑
II 5↓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II
III
IV
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-47
+44
-17
+20
+31
-23
+18
-47
+18
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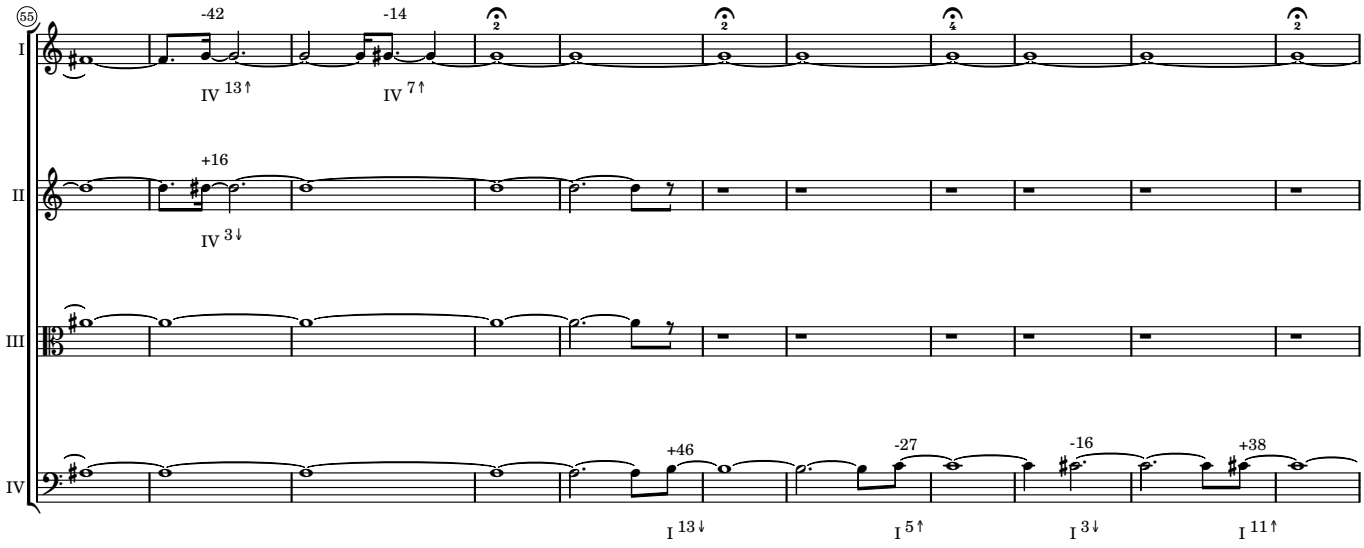
II 13↓
II 3↓
III 3↑
IV 5↓
IV 13↓
II 1
II 7↑
III 1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I
II
III
IV
-42
-14
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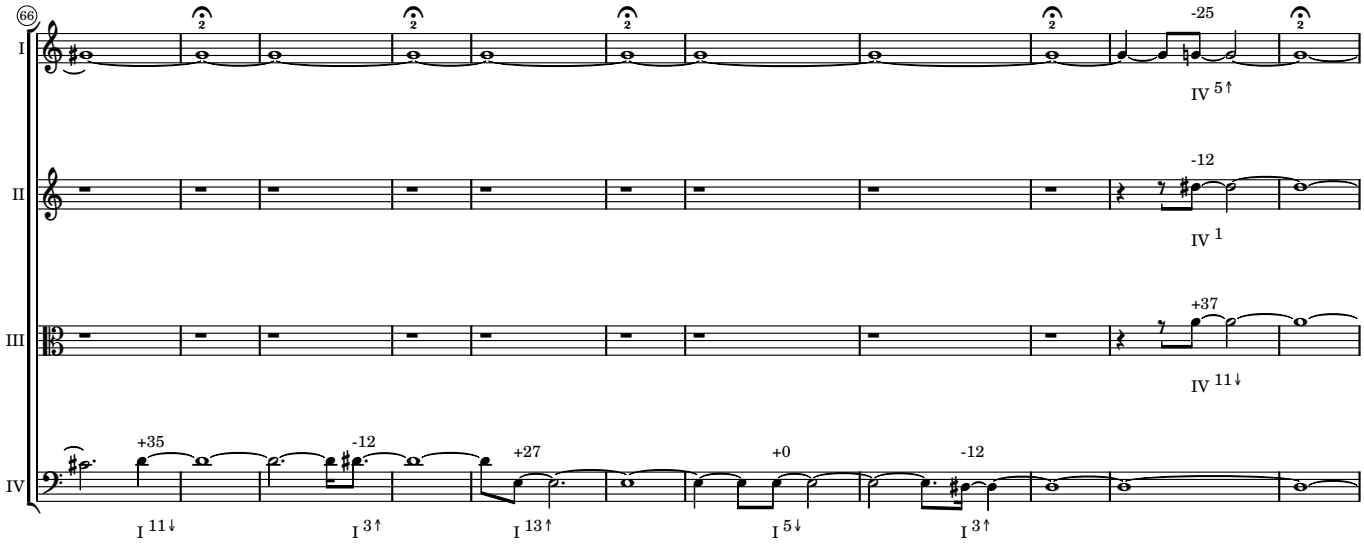
+46
-27
-16
+38
IV 13↑
IV 7↑
IV 3↓
I 13↓
I 5↑
I 3↓
I 11↑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IV
-25
IV 5↑
-12
IV 1
+37
IV 11↓
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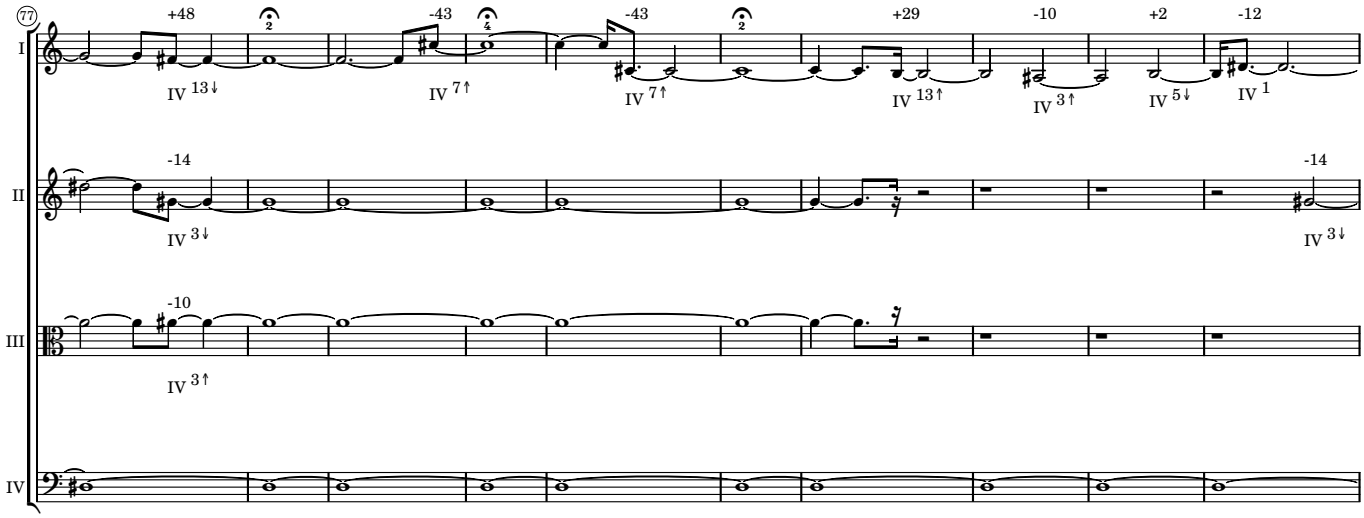
I 11↓
-12
I 3↑
+27
I 13↑
+0
I 5↓
-12
I 3↑


77
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-43
IV 7↑
-43
IV 7↑
+29
IV 13↑
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+2
IV 5↓
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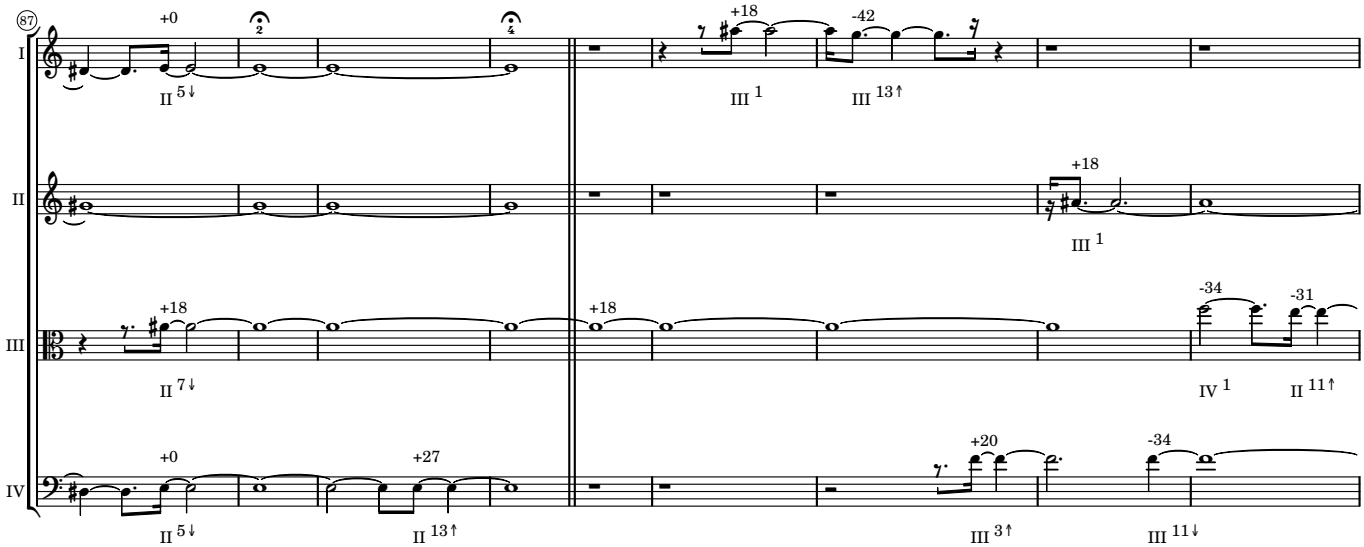
IV 1
-14
IV 3↓
-14
IV 3↓
-10
IV 3↑


87
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II
III
IV
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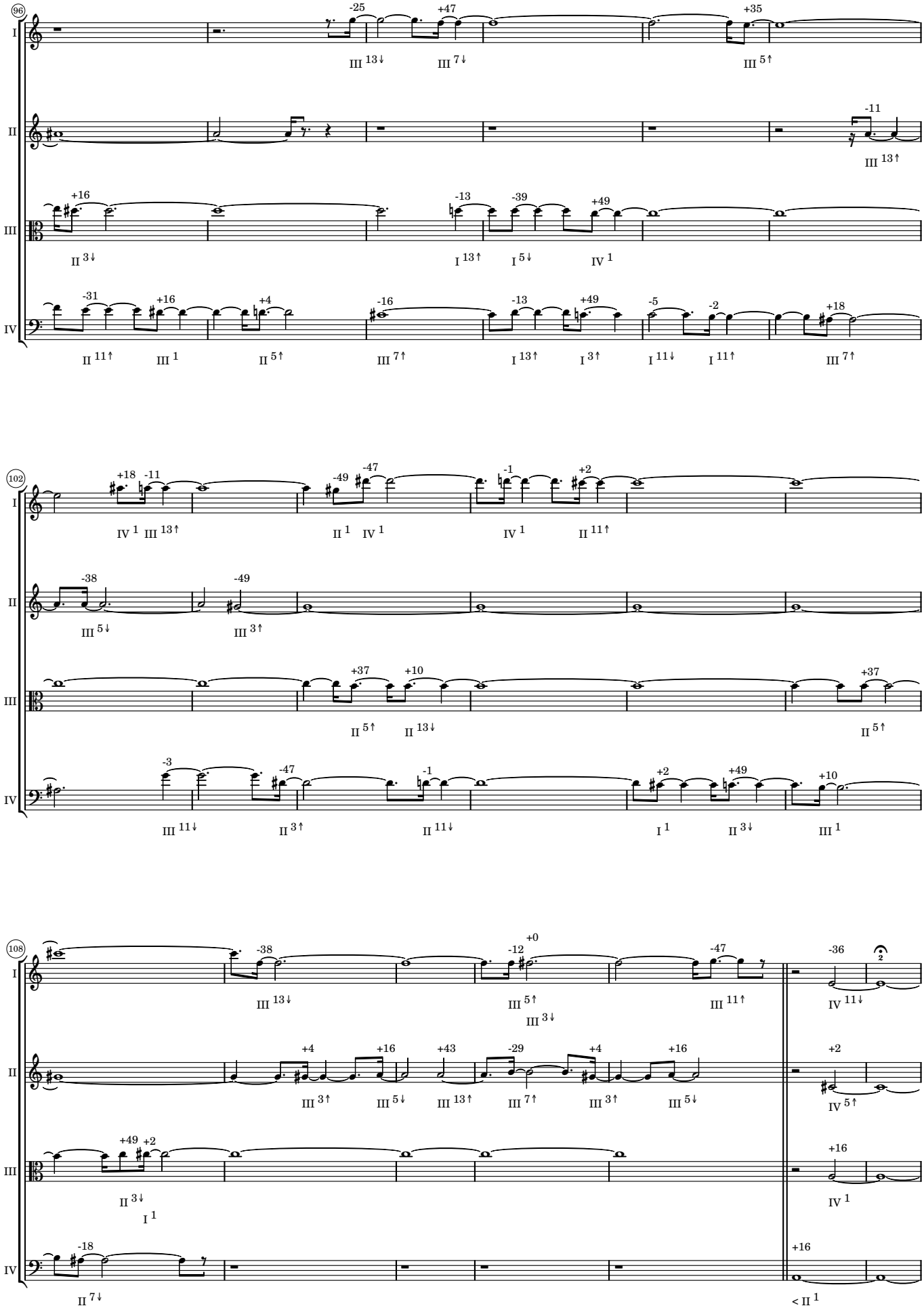
+18
III 1
-42
III 13↑
+18
III 1
+18
II 7↓
+18
-34
-31
IV 1
II 11↑
+0
II 5↓
+27
II 13↑
+20
III 3↑
-34
III 11↓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+16
+4
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-13
+49
-5
-2
+18
102
+18
-11
-49
-47
-1
+2
-38
-49
+37
+10
+37
-3
-47
-1
+2
+49
+10
108
-38
+0
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+16
+2
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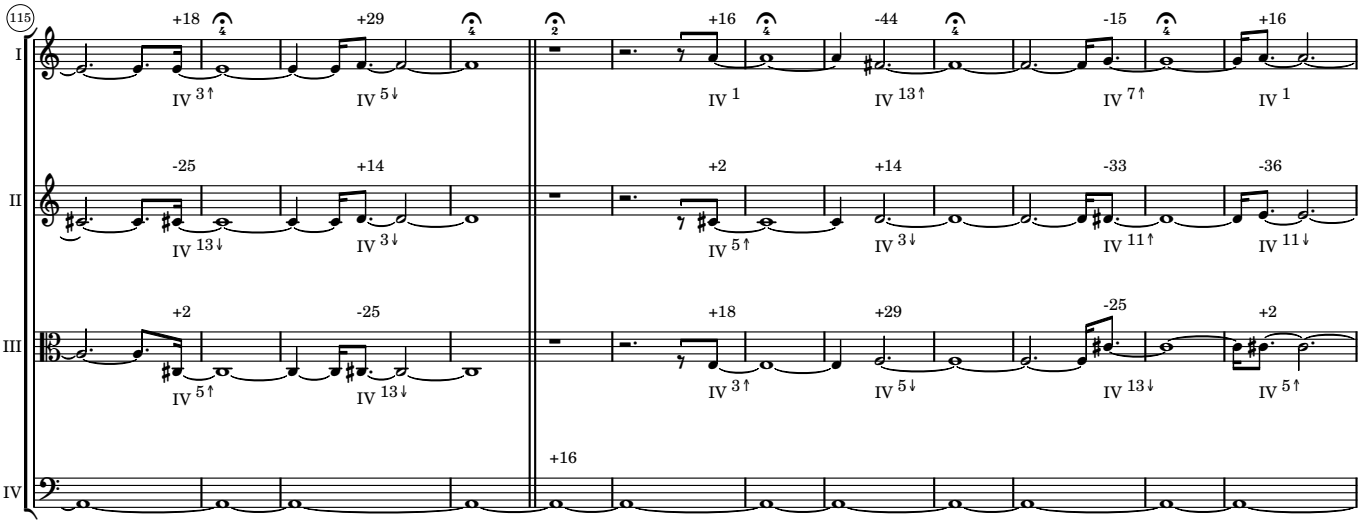
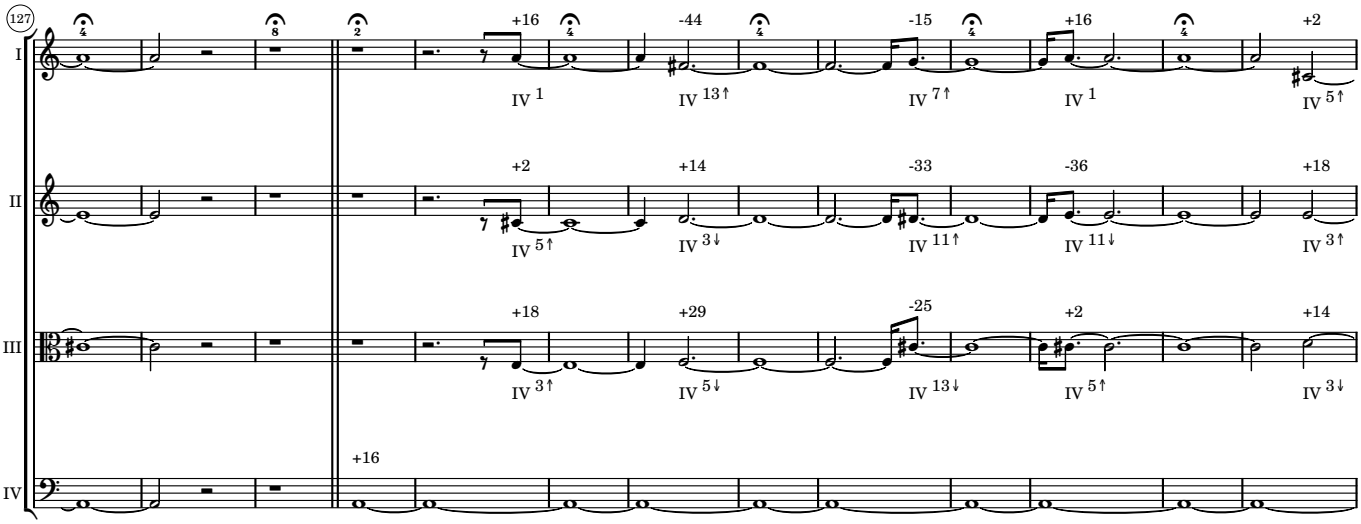
-18
+16


115
I
II
III
IV
+18
+29
+16
-44
-15
+16
IV 3↑
IV 5↓
IV 1
IV 13↑
IV 7↑
IV 1
-25
+14
+2
+14
-33
-36
IV 13↓
IV 3↓
IV 5↑
IV 3↓
IV 11↑
IV 11↓
+2
-25
+18
+29
-25
+2
IV 5↑
IV 13↓
IV 3↑
IV 5↓
IV 13↓
IV 5↑
+16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IV 1
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IV 5↑
+2
+14
-33
-36
+18
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IV 3↓
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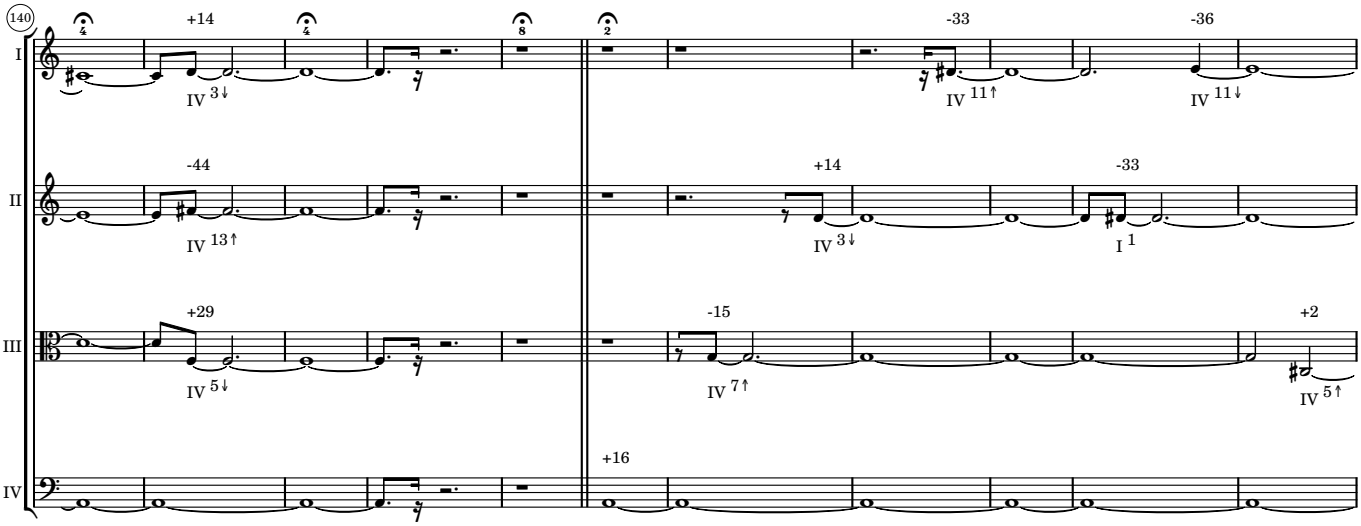
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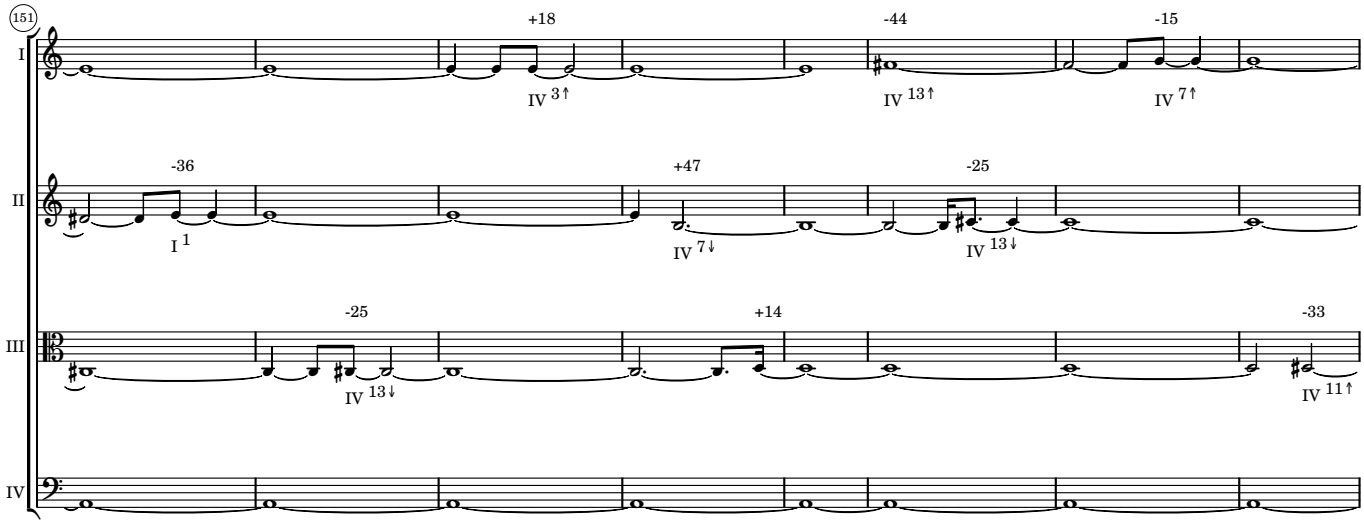
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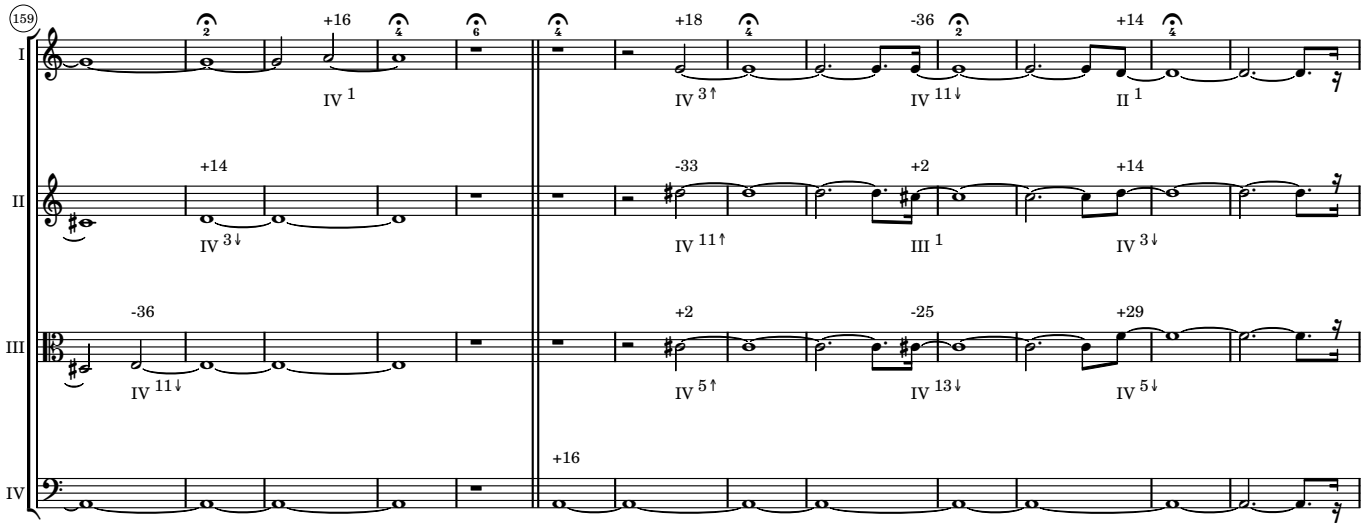
+14
-33
IV 11↑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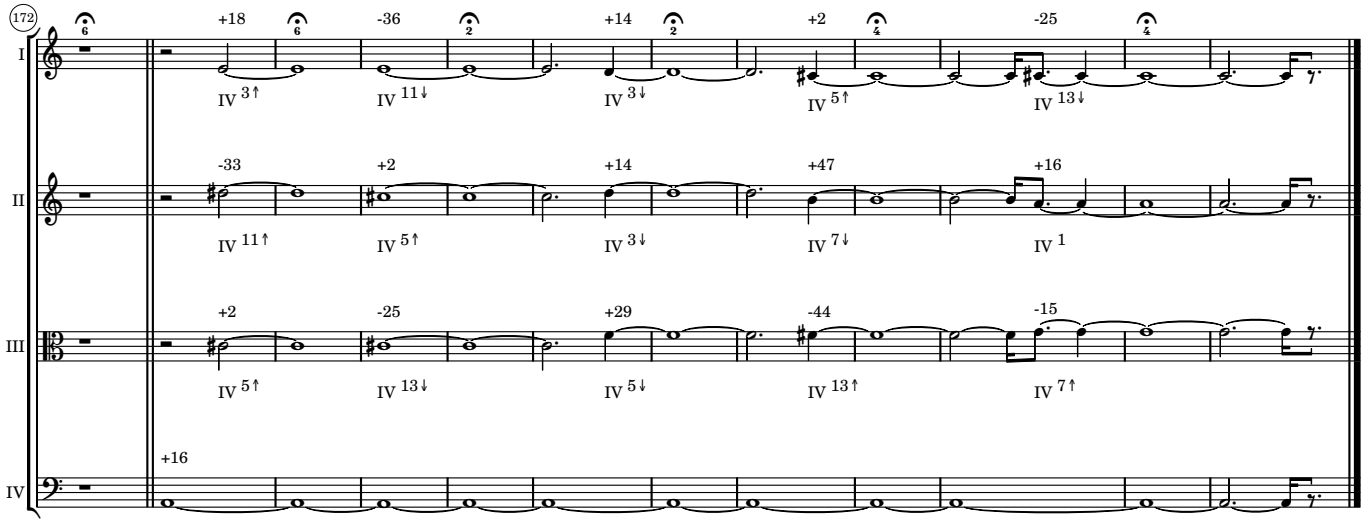
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+14
IV 3↓
+47
IV 7↓
+16
IV 1
+2
IV 5↑
-25
IV 13↓
+29
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-44
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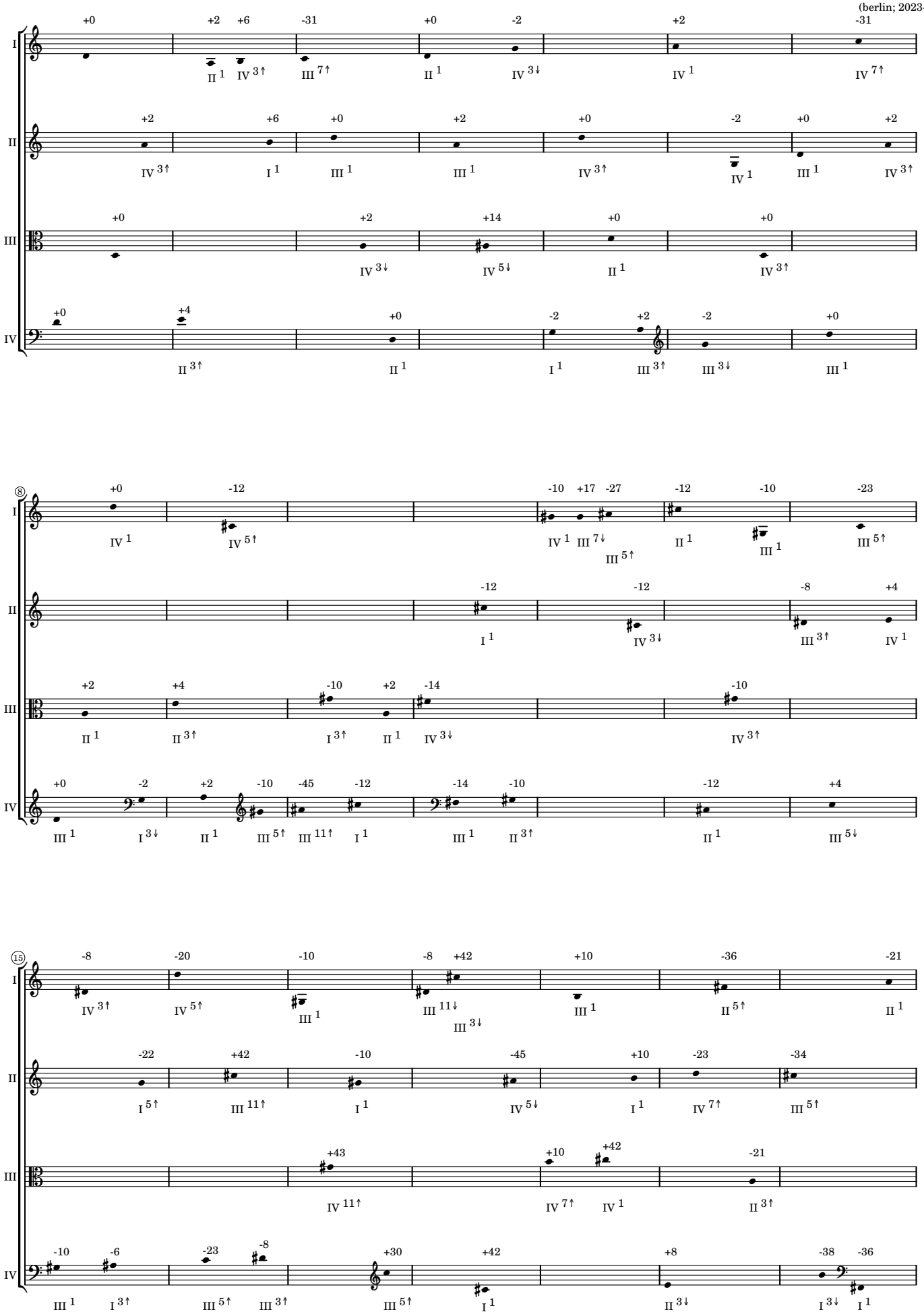
-15
IV 7↑
+16

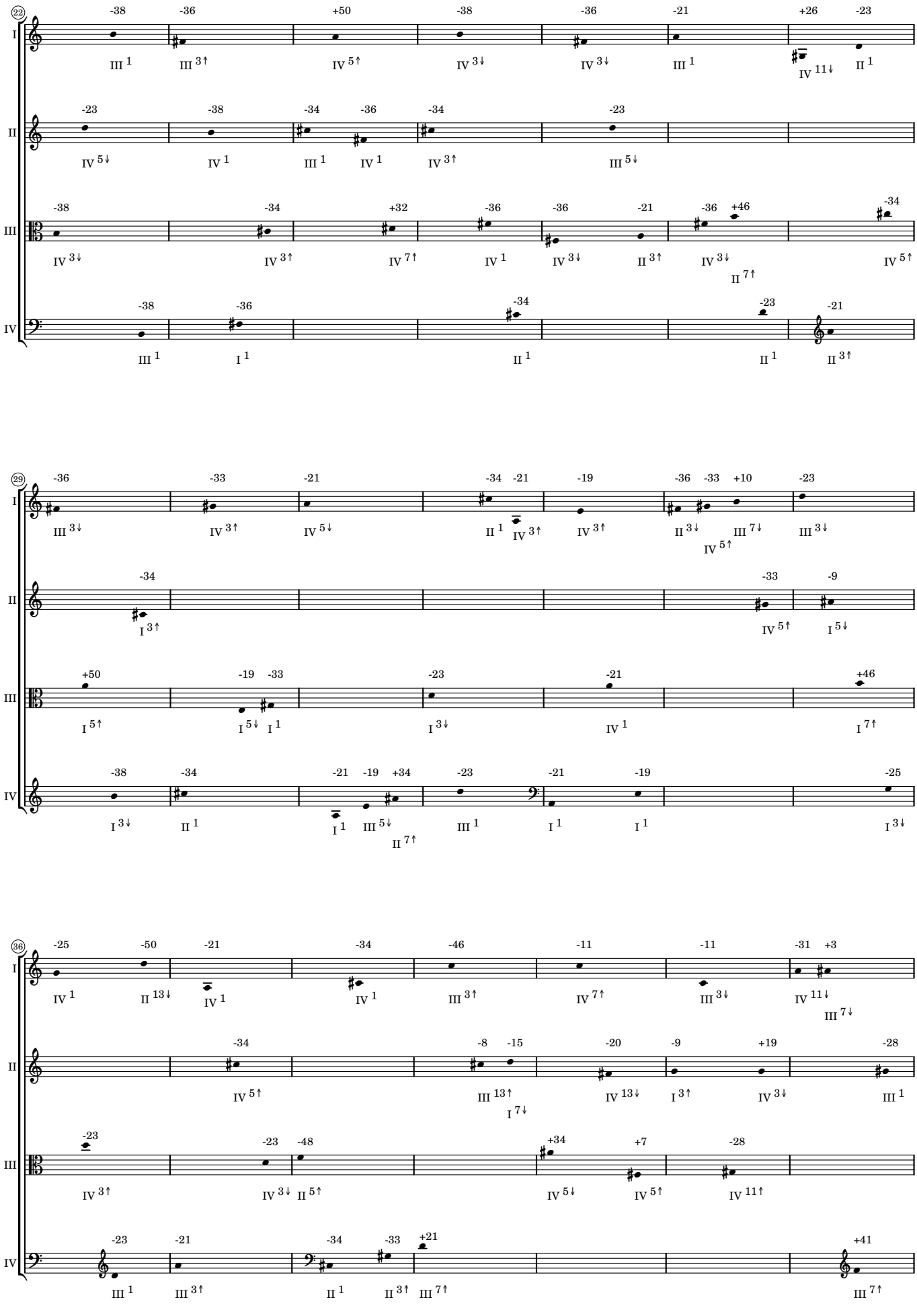
seeds and ledgers 3

for irasema fernandez

michael winter

(berlin; 2023-24)

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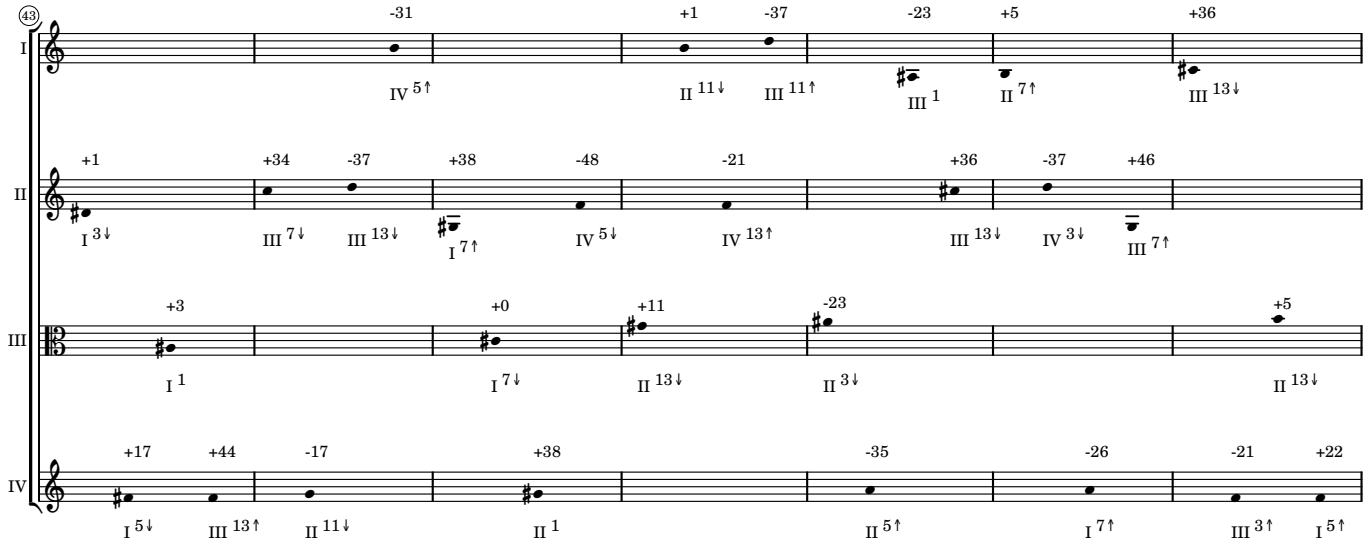
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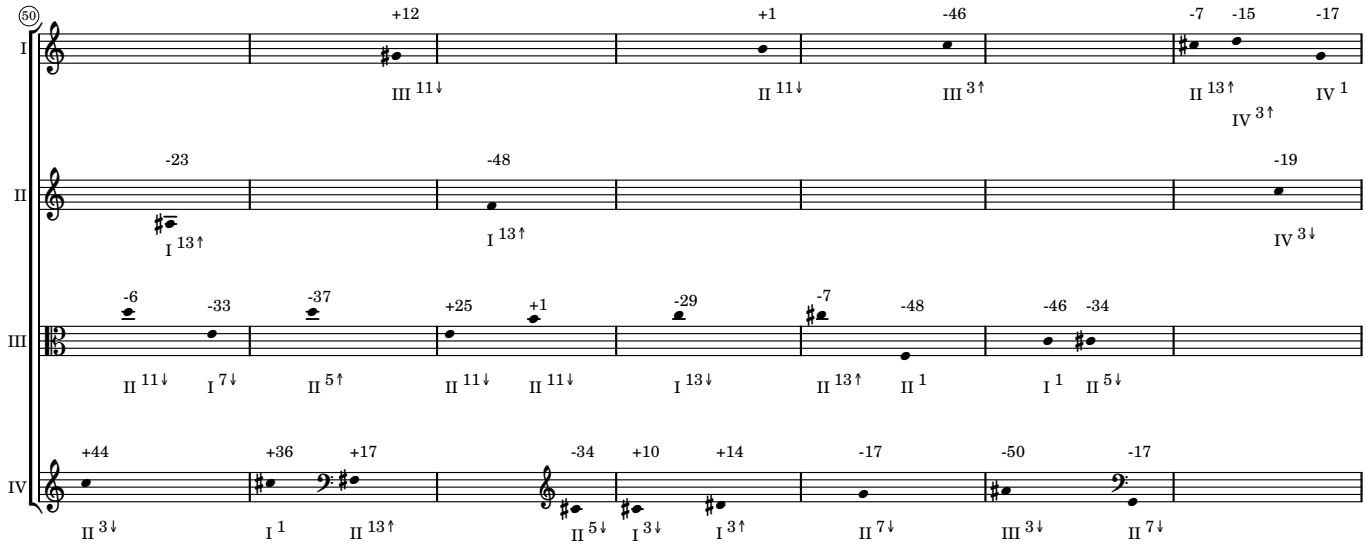
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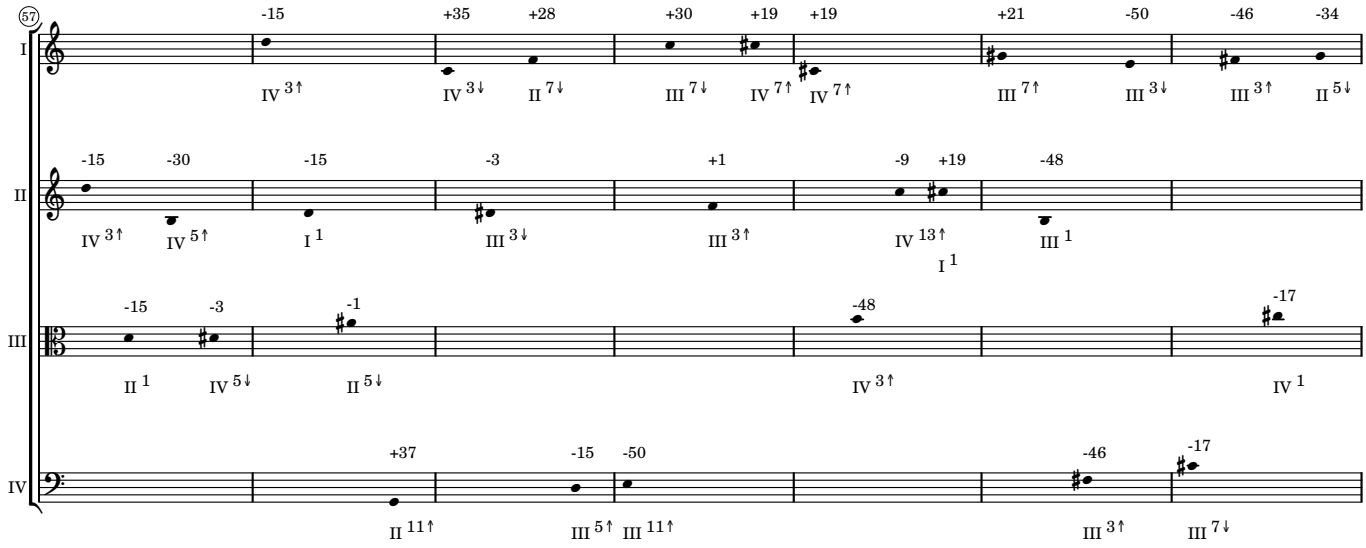
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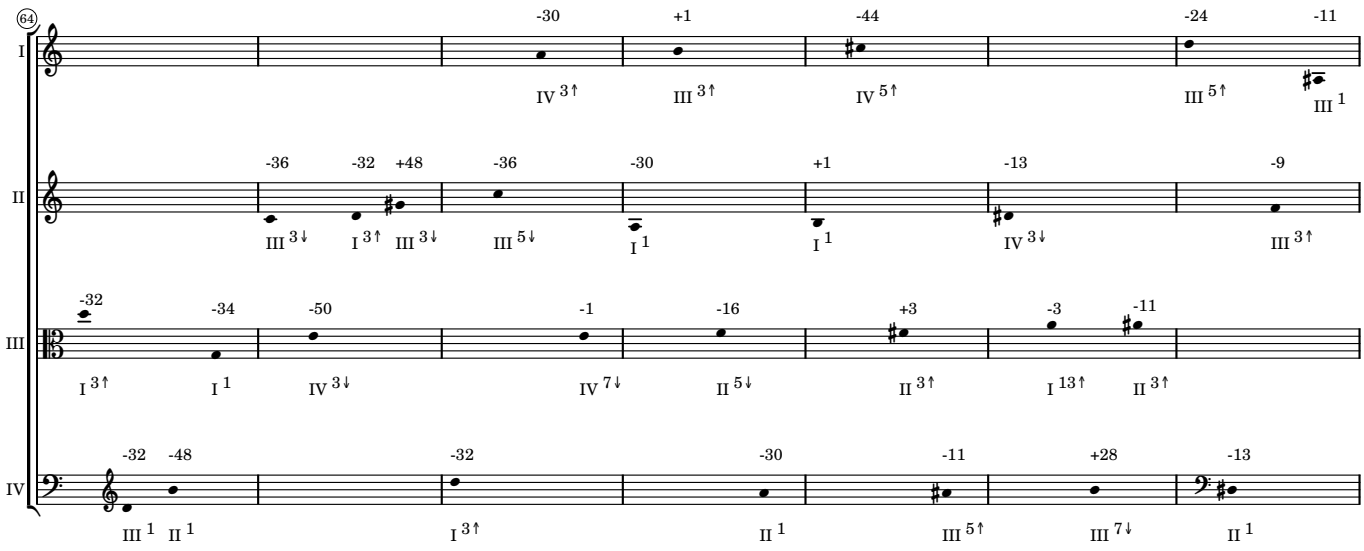
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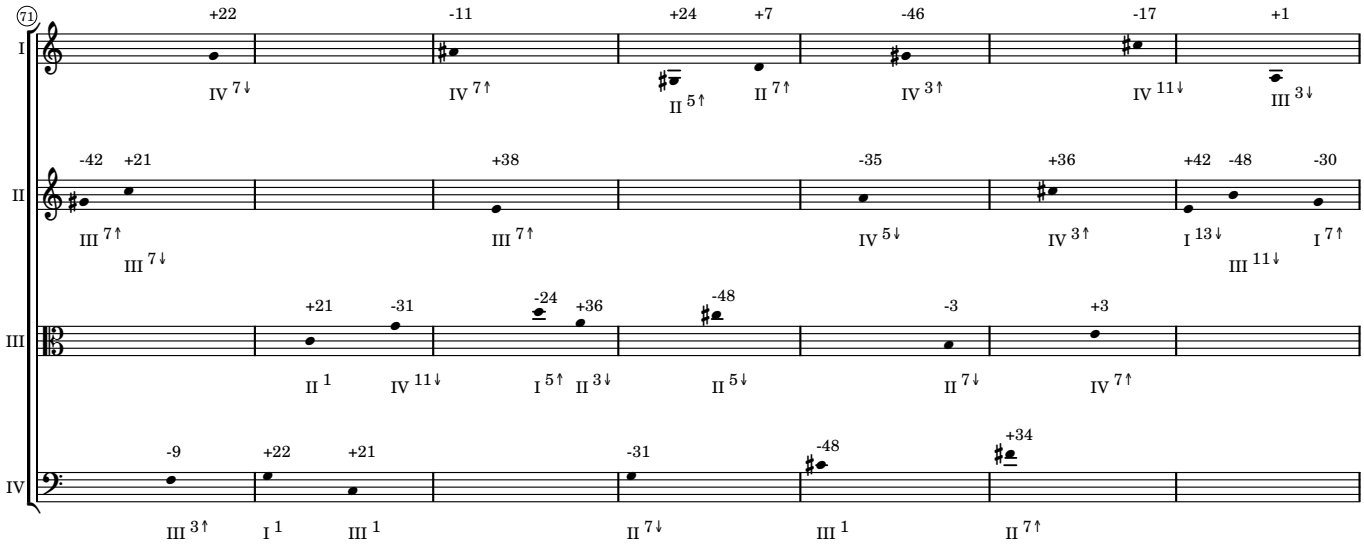
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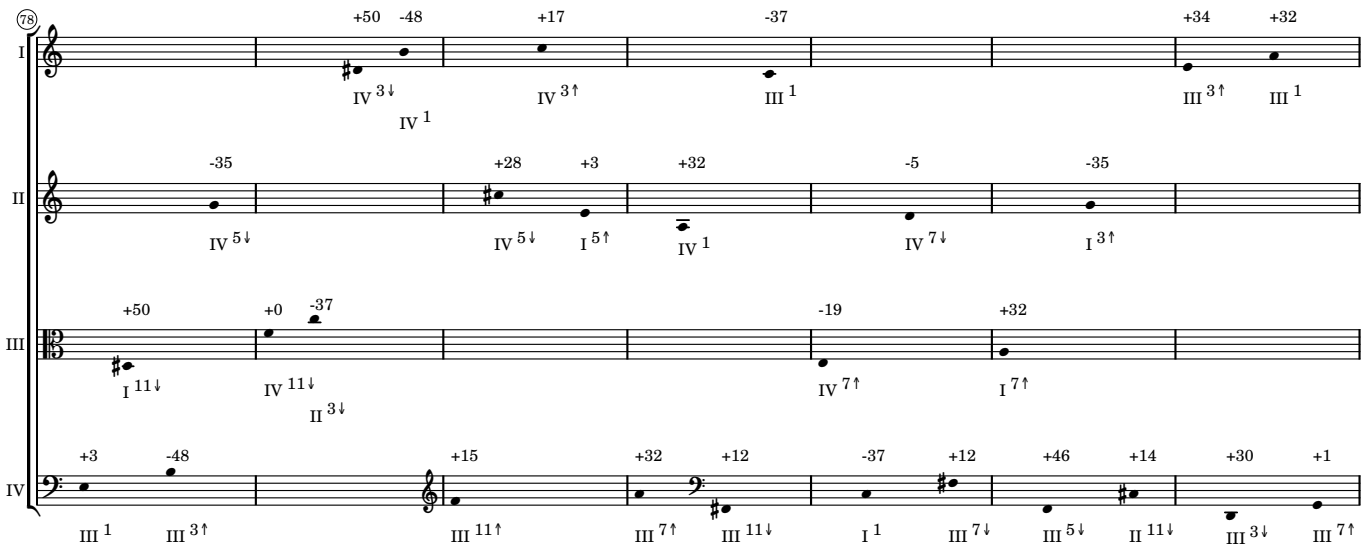
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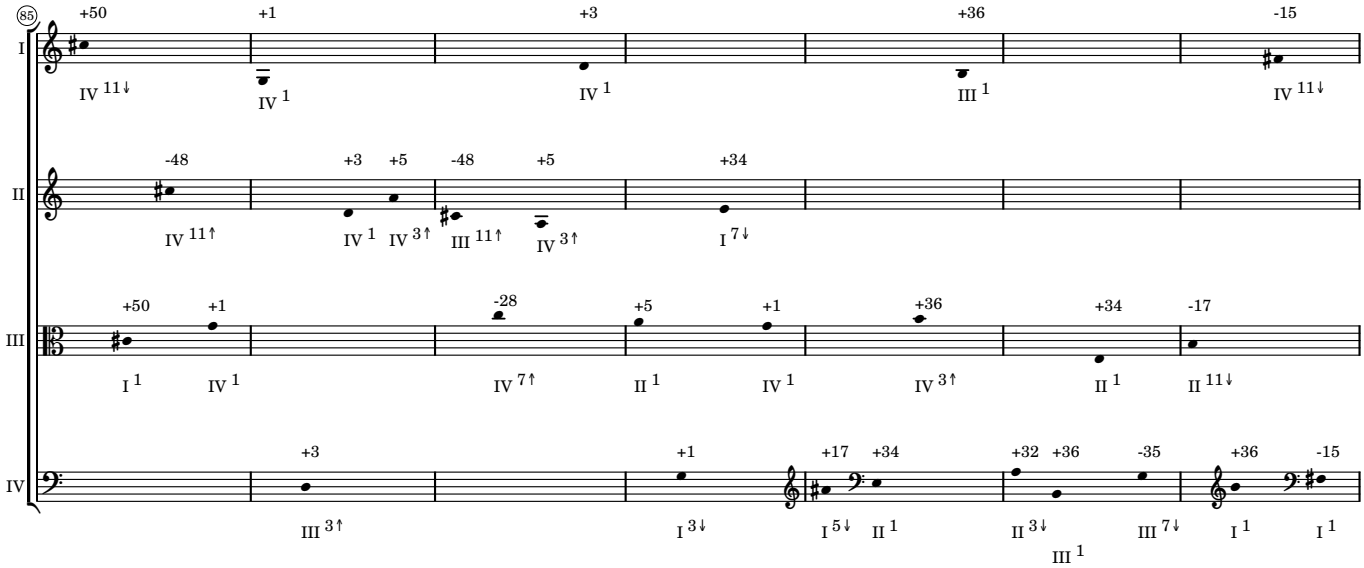
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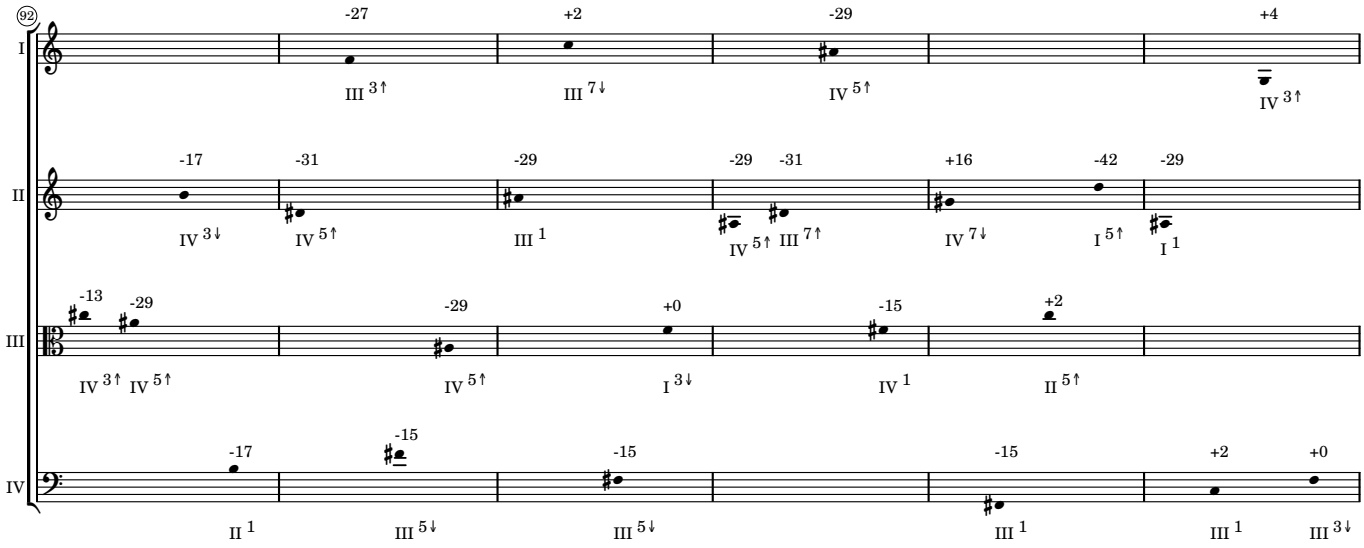
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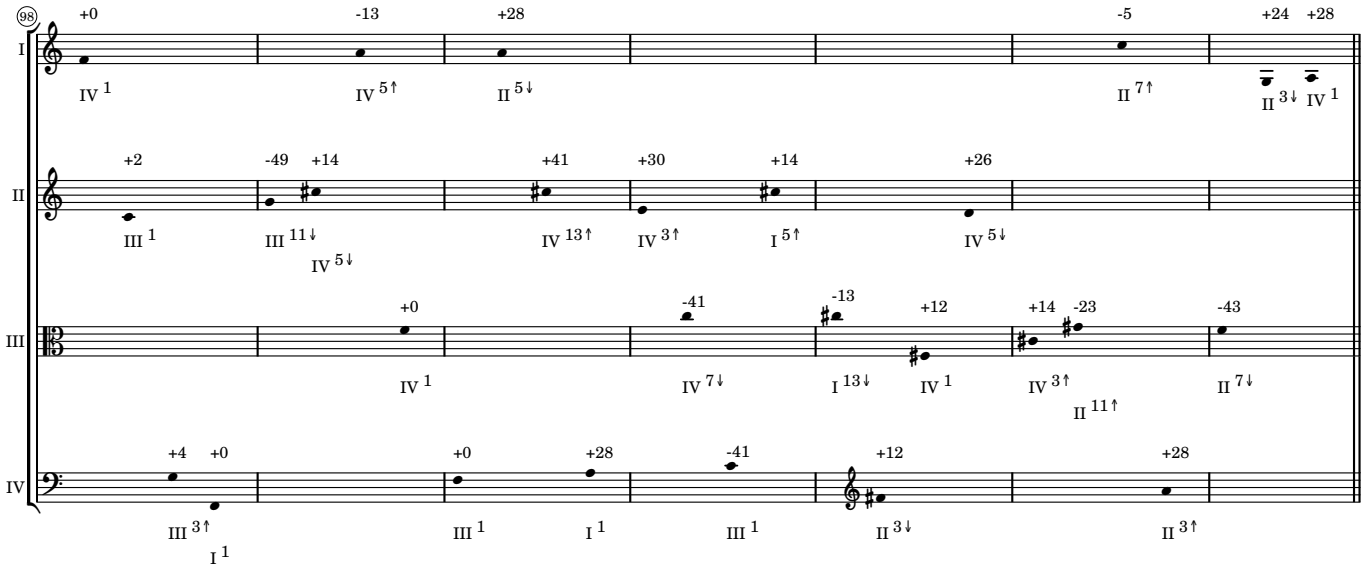
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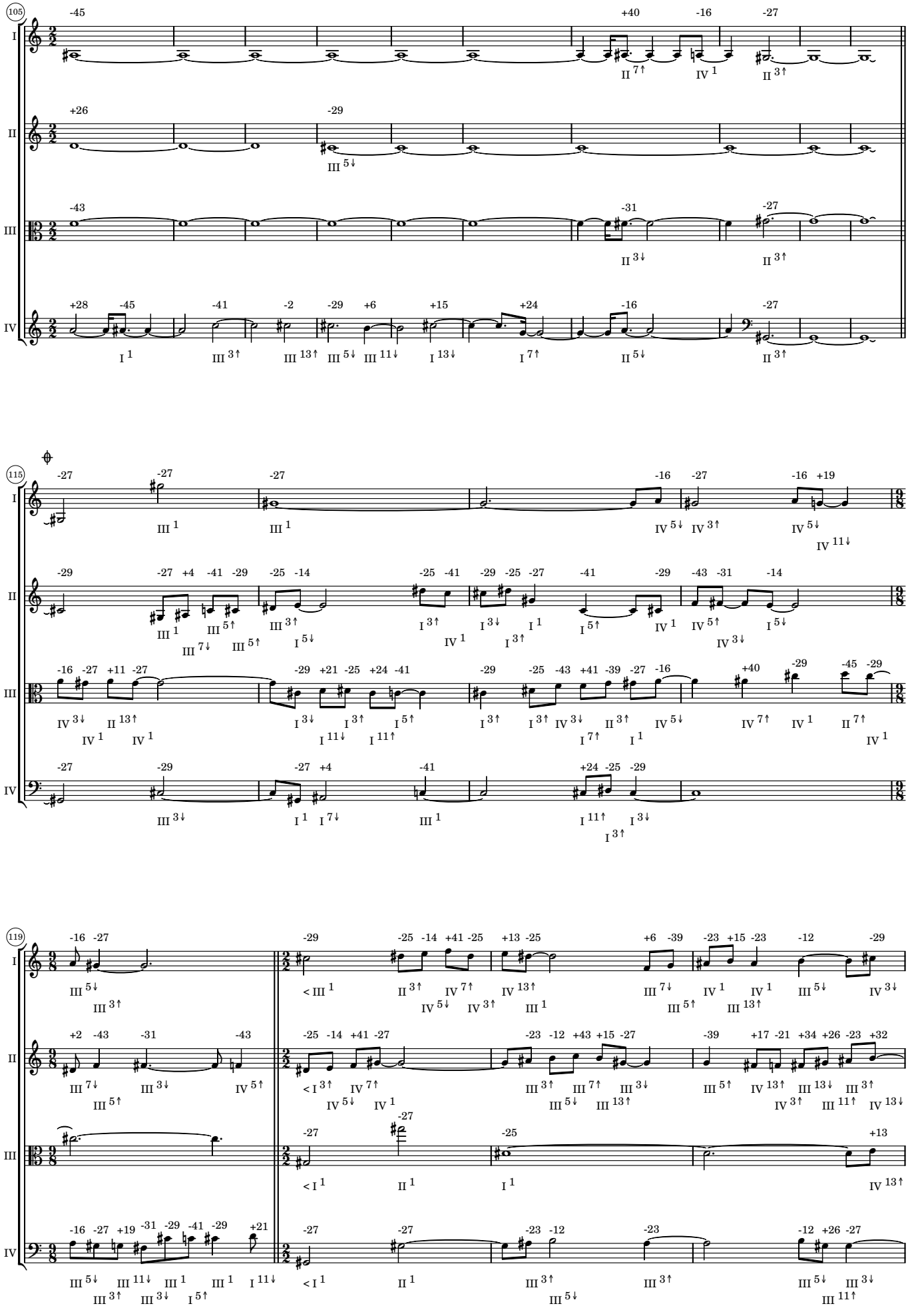
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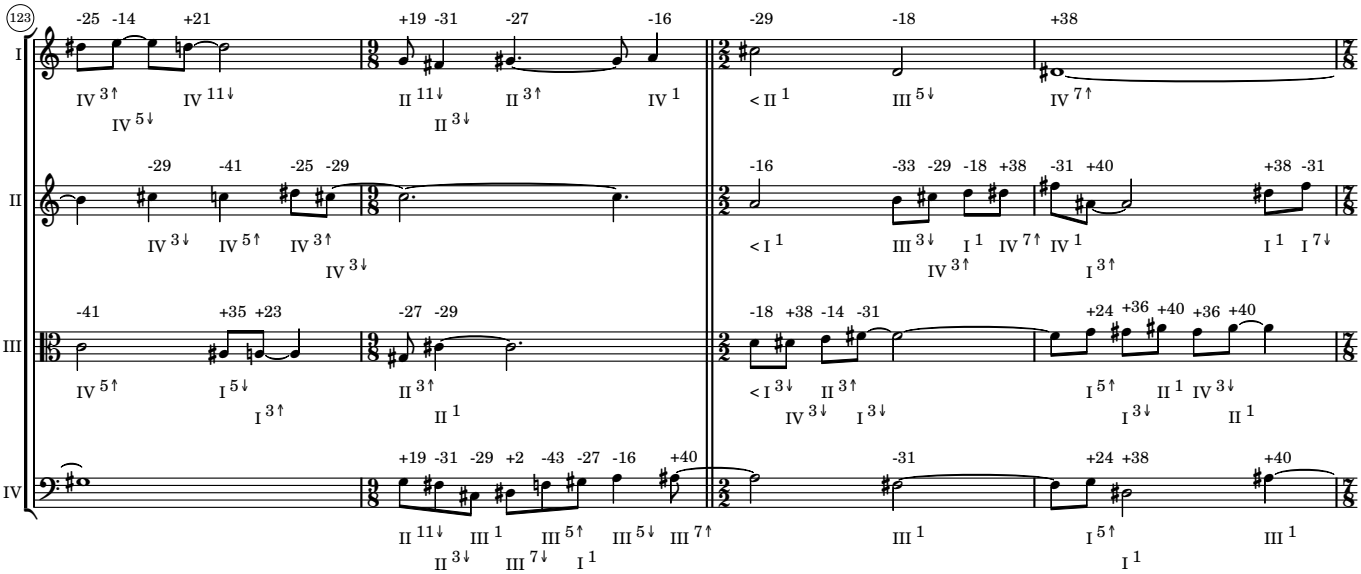
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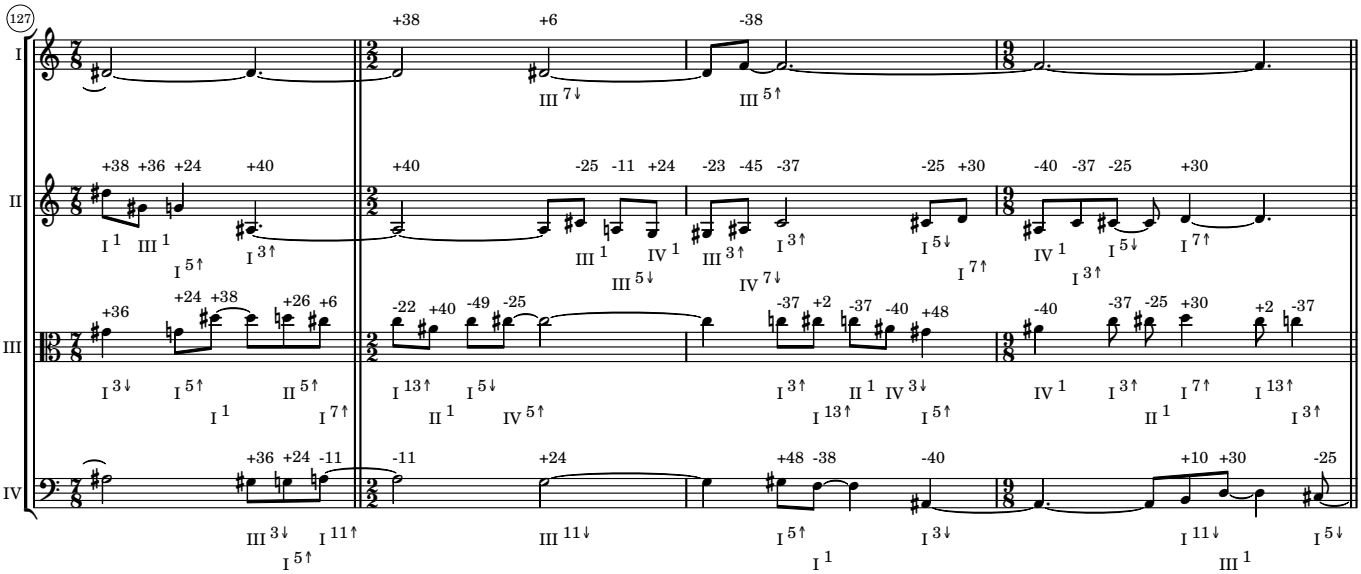
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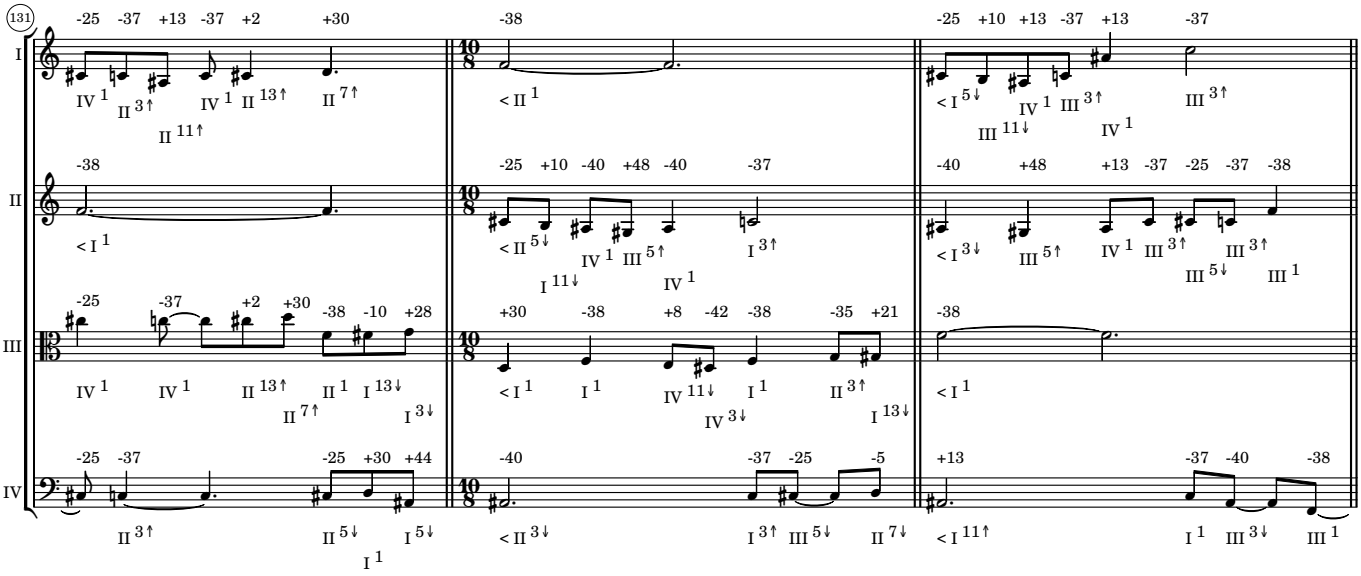
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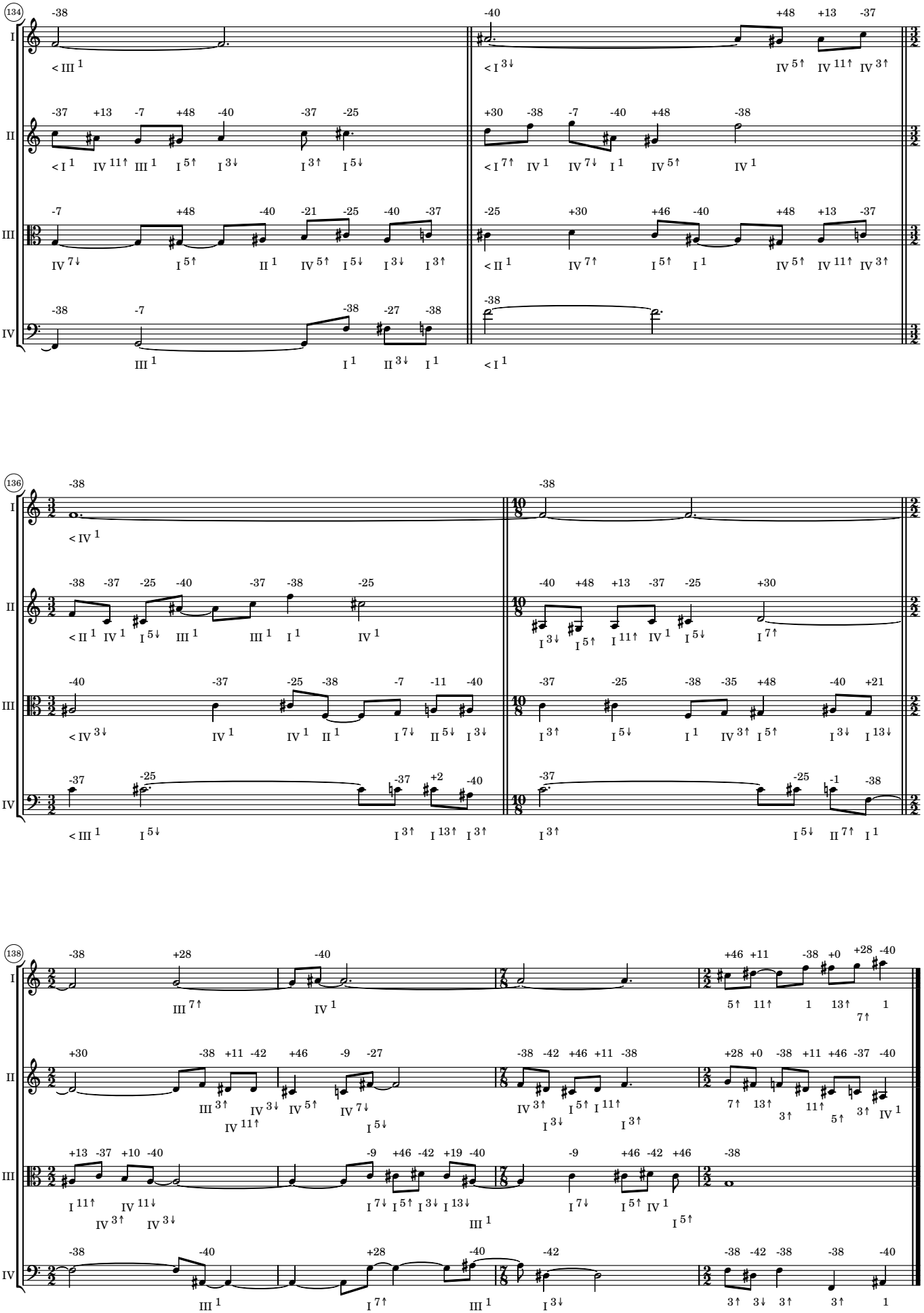
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