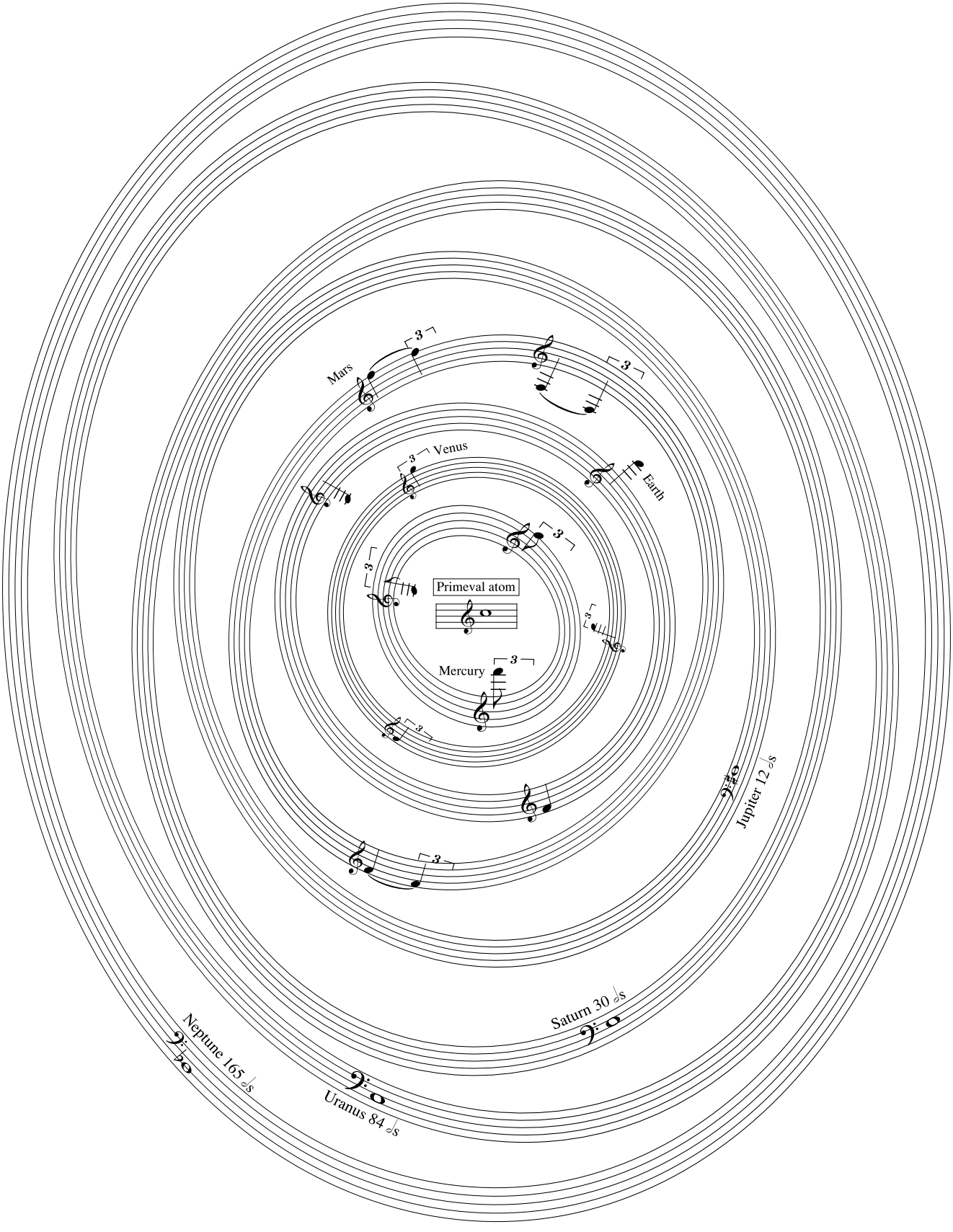
΄ΑΠΕΙΡΟΝ

Cosmological rhapsody for carillon



΄ΑΠΕΙΡΟΝ

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Performance notes

#1: Duration: 11’11”

#2: Dynamics are sparse, as texture and register tend to dictate dynamics.

#3: bar 8 and alike: use the side of the forearms to play the clusters.

#4: Double bar lines indicate a change in tempo (first occurrence between bar 60 and 61).

#5: In bar 27 and alike: take a fraction of time to play the grace notes clearly.

#6: Capital letter X indicates complex time signatures. The rhythmic value to feel and play the dancing motive is the 𝅘𝅥𝅯; hence, I did not beam pitches. (Example in bar 28: a time signature of $^{6}_{4}$ would not only create wrong syncopations but its beaming would also be useless for the performer). Rests in the pedal stave before a Jovian pitch follow the pitch values in the manual. The notation of the Jovian pitches fill the entire bar, as the carillonneur does not control the resonance duration of the bells (Example in bar 45).

#7: If necessary for acoustical considerations, the carillonneur may play the contrapuntal sections at a calmer tempo, so that listeners can hear the counterpoint.

#8: In bar 60 and alike, the fermata 𝄐 is short, almost like taking a breath. In bars 223, the three symbols for fermatas indicate values from long 𝄐 to longer 𝄒 to longest 𝄓. Play the chords majestically and follow the directions of the arpeggios that is upwards for God and downwards for the humans.

#9: I endeavored to place page breaks at suitable location, even though digital score reading has become the norm.

#10: Transfer the lowest notes that are not available on the manual of certain carillons from its manual to its pedal.

Dedication

I humbly hope that this dense composition honors a cultural and scientific heritage.

I sincerely hope that this celebratory composition expresses the beauty of the carillon.

I ardently hope that this energetic composition reflects the reverent wonder with a touch of fear inspired by infinity.

At the end of this pandemic, may we “emerge once more to see the stars”.

Programme notes

Just as bold seafarers ventured out to circumnavigate our blue planet in the XVIth c., daring space exploration is the dream of our times. The Matthias Vanden Gheyn contest for carillon composition combines science, new music, composition, bells and heritage, all in which I take a lively interest:

- Science, because science connects all of us at the conscious factual level. Until disproven, a fact is a fact.
- Music, because music connects us at the unconscious level.
- New music, because any art form without new artwork and a young audience is doomed.
- Composition, because of the hard fought privilege to construct and inhabit your own world.
- Bells because their acoustic properties are astoundingly complex regardless of their cultural context. Bells superbly ignore staccato, the ultimate reduction of the infinite legato.
- Heritage, because I do not own anything. I receive from previous generations and I pass on to the next generations.

One hears that what one wants to hear. One hears that what one can hear. High up in his tower, the carillonneur plays for the whole town. The carillon's sonic lace shields the town. The carillonneur rhapsodizes for the astronaut racing towards Mars, hence the rhapsodic subtitle of this piece. The title *΄ΑΠΕΙΡΟΝ* (pronounce *Apeiron*, from ἀ- a- = without and πεῖραρ peirar = limit) refers to the unlimited, the indeterminate, i.e. the primal principle of all matter already postulated by Anaximander of Miletus, Pre-Socratic philosopher of the VIth century BCE. My composition contains the same number of motives as the planets in our solar system. The piece starts and ends with the pitch that is the exact center of the carillon's range. This central pitch represents Georges Lemaître's primeval atom, the postulate he published in 1933. This central pitch disintegrates into clusters, as in Lemaître's relativistic cosmology (his theory on the expansion of the universe published in 1927 and popularly referred to since the 50s by the misnomer, the Big Bang's theory). Soon the clusters morph into a joyous dance like matter floating in space. The sonic anagram of the celebrated astrophysicist forms calls sent out over the city and metaphorically into outer space. I assigned pitches to the planetary-rotation periods of the Jovian planets to form a majestic bass line. At one single point, the music flow freezes into a grave reference to Lemaître's second life calling, his staunch Christian faith. To him religion and science were peacefully compatible. I quote the celebrated XVIIIth c. Flemish carillonneur and bell founder Matthias Vanden Gheyn. On his music, I applied rhythms derived from the planetary-rotation period of the four telluric planets. *΄ΑΠΕΙΡΟΝ* ends in a celebratory, energetic and optimist mood, quoting the final line of Dante's *Inferno* relevant in the current troubled times of pandemic: "and then we emerged to see the stars again".

Description of the musical material

The compositional material of *΄ΑΠΕΙΡΟΝ* consists of eight motives: 1° pitch C, 2° disintegration clusters, 3° dancing motive, 4° the triple motive of George, Lemaître and *INRI*, 5° Matthias Vanden Gheyn's two quotes, 6° the rhythmical planetary-rotation periods of the four telluric planets, 7° the pitches and their durations of the planetary-rotation periods of the Jovian planets and 8° the whole-tone motive of open fifth chords.

1° Pitch C

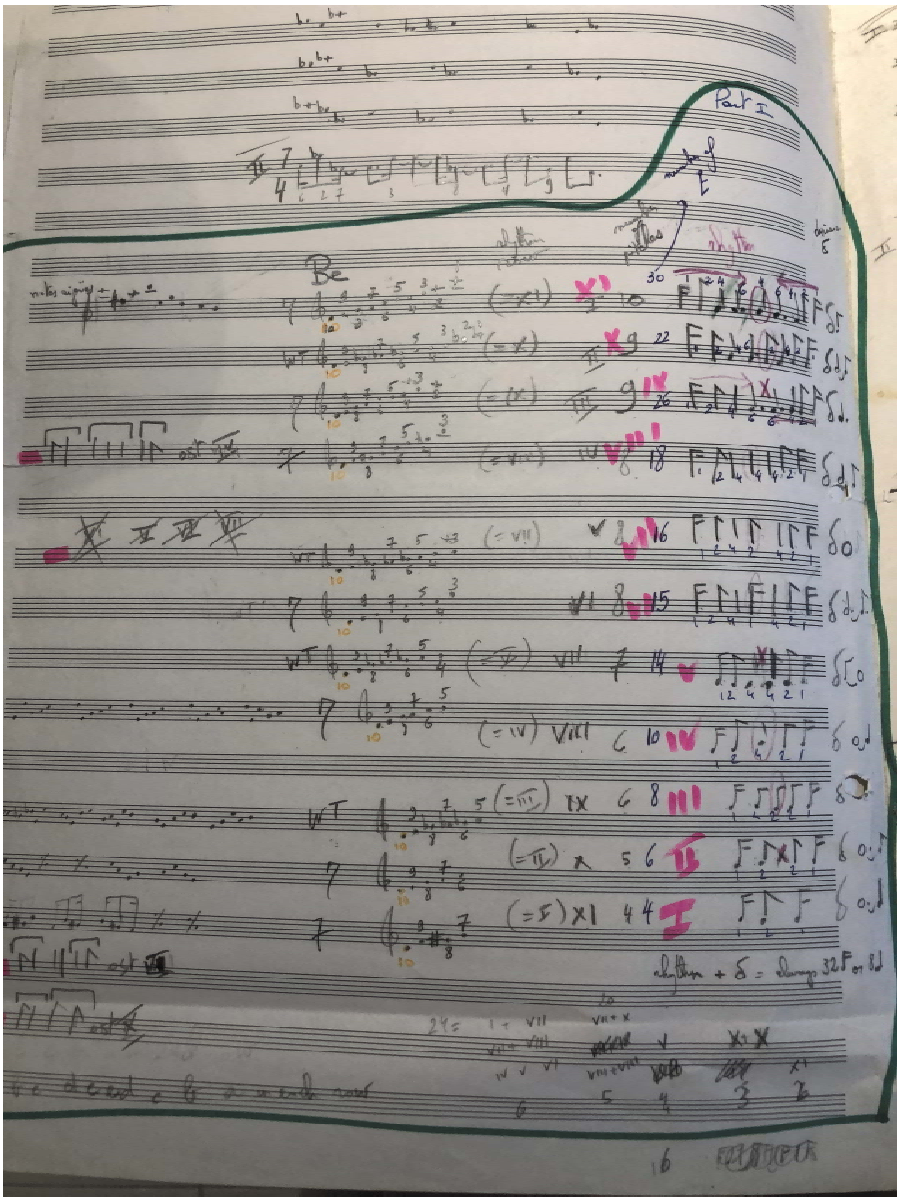
Pitch C5 is referred to as central pitch C because C5 is the exact centre of the sonic universe of the four-octave carillon B♭2 to C7 omitting the unavailable pitches B♮2 and C♯3. Pitch C5 is the centre of the composition (see cover). I reach pitch C orbiting four times in contrary motion using chromatic pitches with the rhythmic values of the four telluric planets Mercury, Venus, Earth and Mars (first occurrence bars 16 to 22, see motive 6°). Pitch C leads to a ringing signal, six times from the upper to the lower register (first occurrence bars 24 to 26). In the coda in bar 295, the last seventh ringing unfolds from the lowest to the highest register as an expression of optimism. The prevalent rhythm of motive 1° is the iambic meter.

2° Disintegration clusters

The disintegration clusters contain all pitches with the exception of all pitches C, which belong to the motive 1°. The disintegration gestures contain the embryo of most of the musical material : the semitone (dancing motive 3° in 𝄖) and the whole tone (dancing motive 3° in WT, the beginning of MVG1, motives 7° and 8°). Each of the three subsequent appearances of the disintegration clusters repeats a shorter section of bars 9 to 15 (bar 82 = bar 9, bar 83 = bar 10, 84 = 11, 85 = 8, 147 = 12, beat 1 and 2 of 148 = 13, cluster of 148 = bar 12 and 1st cluster of 15, 203 = 3rd and 4th cluster of bar 15). Each appearance takes place in a less fast tempo (♩ = 160 to 150 to 140 to 130). I omitted this motive 2° at bar 238. Like a majestic *Cantus Firmus*, a massive C3 underlines each of the eight appearances of the disintegration clusters.

3° Dancing motive

Diatonic notes (from bar 28, 169 and 216), whole-tones (from bar 44 and 156) and 𝄖 (from bar 94, 110 and 210) constitute the dancing motive. Superimposing minor thirds works well because of the minor third is the first harmonic in bells. This motive 3° so-called dancing motive appears eight times. Grandsire caters is a method of ringing church bells. I used the permutations within sequences of eleven bells of a grandsire cater to generate pitches and their rhythms, as evidenced by this excerpt from my draft manuscript:



I omitted all the pitches appearing in the lowest octave C3 to B3, so that the sound of these massive bells would not interfere with and obscure motive 7°.

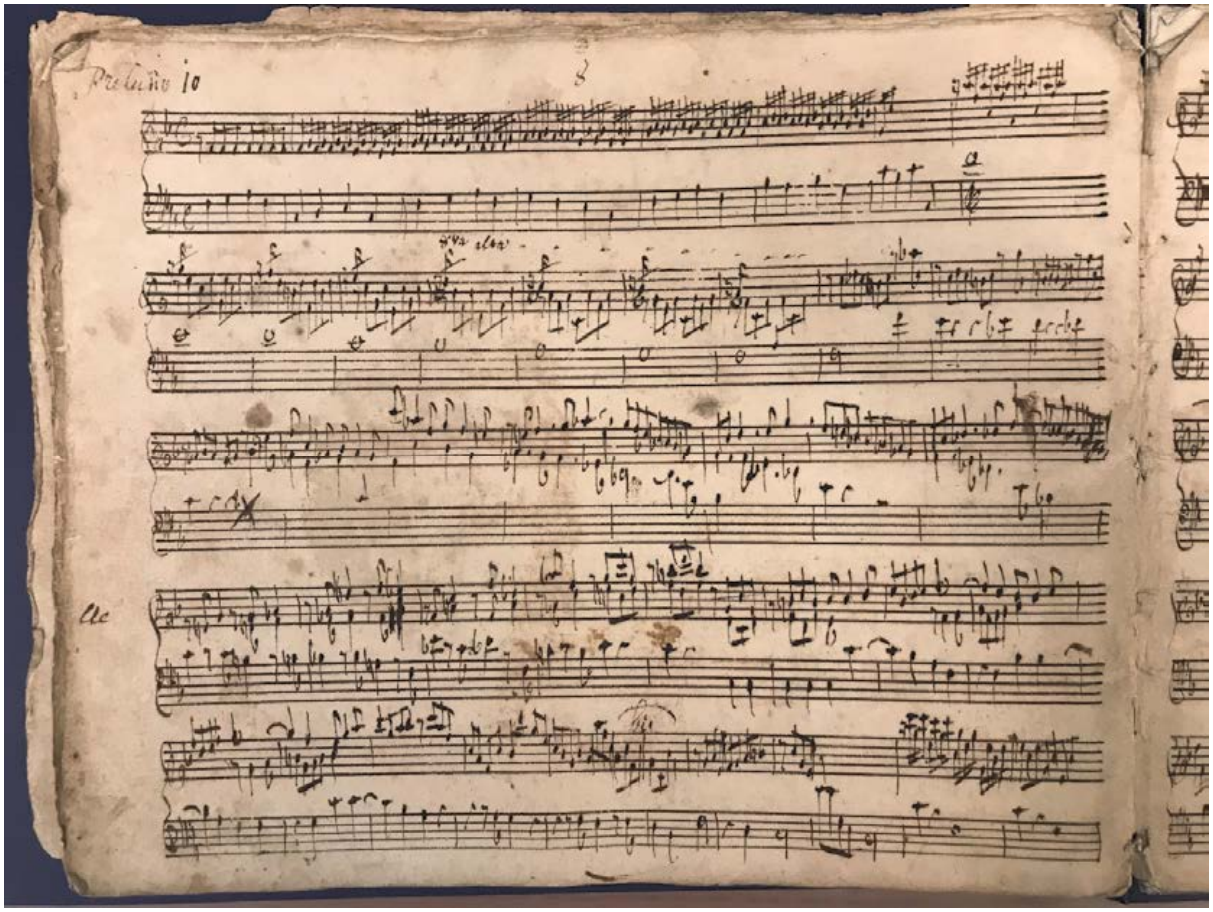
4° The triple motive of Georges, Lemaître and INRI

The sonic anagram of Georges Lemaître's name is straightforward. Starting with letter a = pitch A, I assigned a pitch to each letter of the alphabet. I congregated the last two letters of Lemaître's first name into a single pitch: final letters 'es' = E♭. In French the circumflex accent reveals the presence of a letter 's' that has disappeared, hence I assigned pitch A♯ or ais to vowels 'aî' in the second syllable of the astrophysicist's surname. The GL motive appears four times in decreasing values, from 𝅝 to 𝅗𝅥. to 𝅗𝅥 to ♪, displacing the last Georges motive from bar 216 to the upbeat of bar 222 to create a *stretto* of GL. This stretto in ♪s leads to a moment of suspended reverence in bar 223 in reference to the fact that Lemaître had two callings. The renowned cosmologist and pedagogue was also a catholic priest. To him scientific enquiry and unwavering faith were compatible. Hence, in bar 223, I created a triple X-shaped chiasmus between GL and *INRI*. Triple refers to the Trinity in Christian doctrine and capital letter X to *Χριστός* (Christ). *INRI* is the abbreviation of *Iesus Nazarenus Rex Iudaeorum*. The vertical combination of GL and INRI happens to generate the *deuterus* ecclesiastic

mode. This Phrygian mode without pitch B♭ provides a peaceful cadenza to MVG's tonality of F Major at bar 224.

5° Matthias Vanden Gheyn's two quotes

I commemorate carillonneur Matthias Vanden Gheyn with two quotes, referred to in the analysis by the abbreviations MVG1 and MVG2. MGV1 is the melody in the pedal part of the first fifteen bars of his *Preludium* No. X in F Major for carillon. MGV2 is the melodic counterpoint of bar 33 (last two pitches) to 38 (beat 1 and 2) of the same *Preludium*:

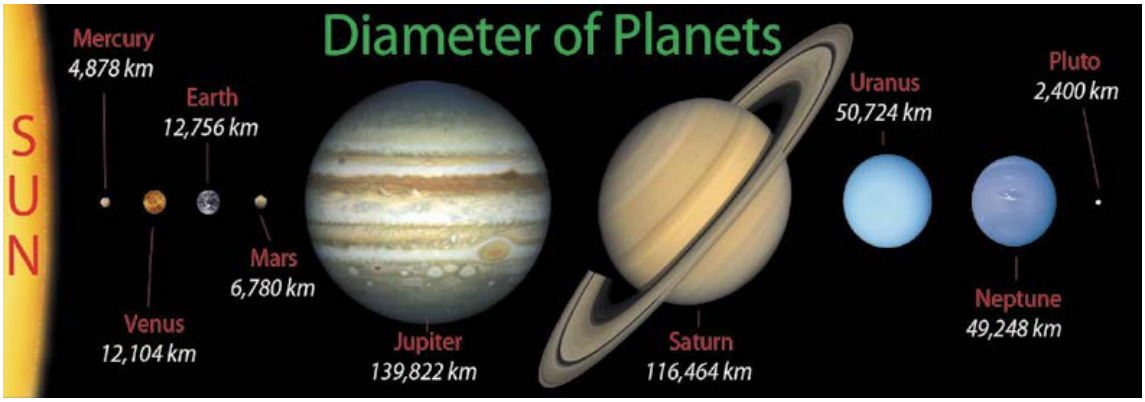


6° The rhythmical planetary-rotation periods of the four telluric planets

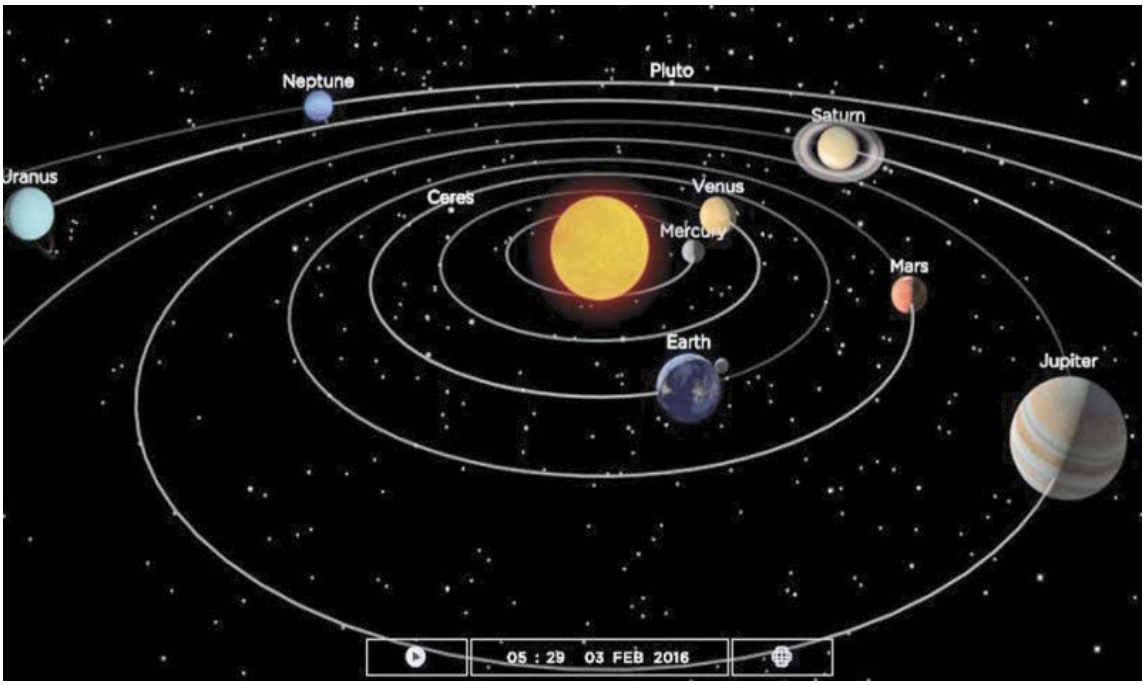
The planetary-rotation period of the four telluric planets is approximately 365 days for Earth, 687 for Mars, 224 for Venus and 87 for Mercury. If I assign a ♩ as the rhythmic value to Earth, I obtain ♩ + ♩³ for Mars, ♩³ for Venus and ♪³ for Mercury (see cover of the score).

MGV1 unfolds five times, each time in invertible counterpoint, each time strictly following the converted rhythmic values, each time at a slower tempo (from ♩ = 100 to 90 to 80 to 70 to 60) and each time following a precise order of entry:

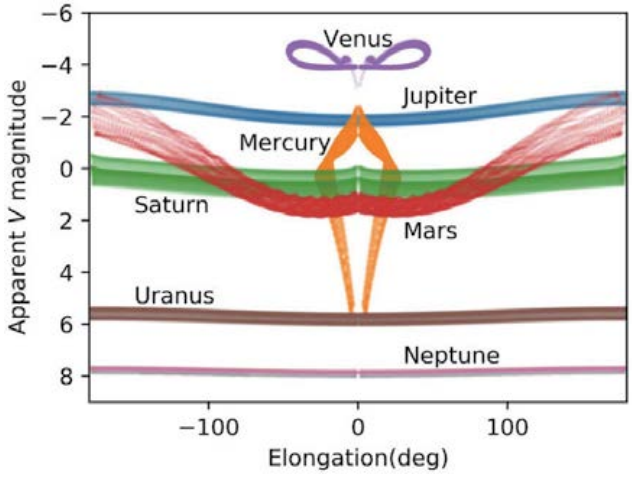
- The first occurrence of MGV1 (20 bars long starting at bar 61) ranks the telluric planets from large to small according to their diameter, thus Earth, Venus, Mars and Mercury :



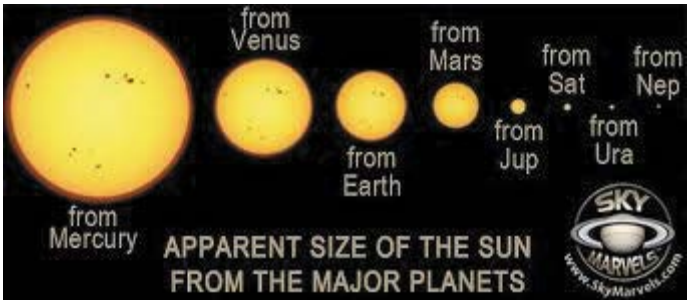
- The second occurrence of MGV1 (19 bars long starting at bar 127) ranks the planets according to their distance from the sun, from the furthest to the closest, thus Mars, Earth, Venus and Mercury :



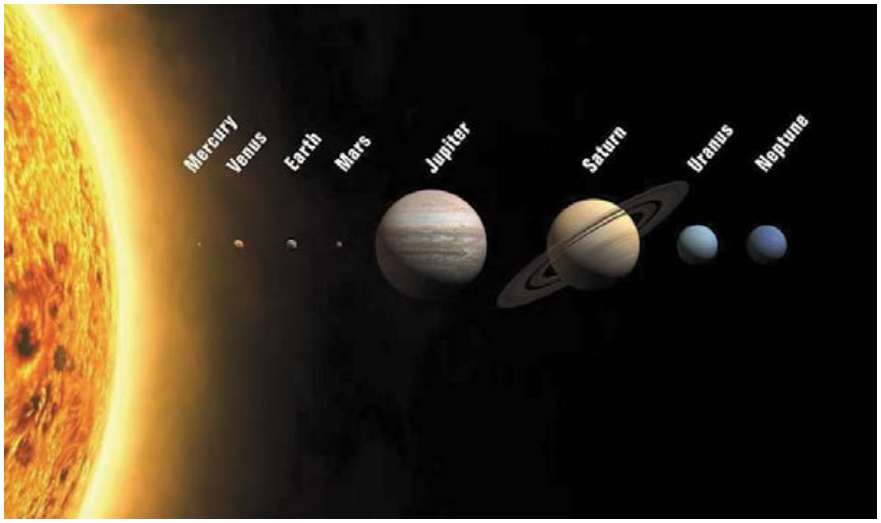
- The third occurrence of MGV1 (16 bars long starting at bar 186) follows the order of brightness, thus Venus the brightest, then Mars, then Mercury :



- The fourth occurrence of MGV1 (15 bars long starting at bar 224) superimposes from small to large the four planets according to their size in the sky, i.e. Mars, then Mercury, then Venus :

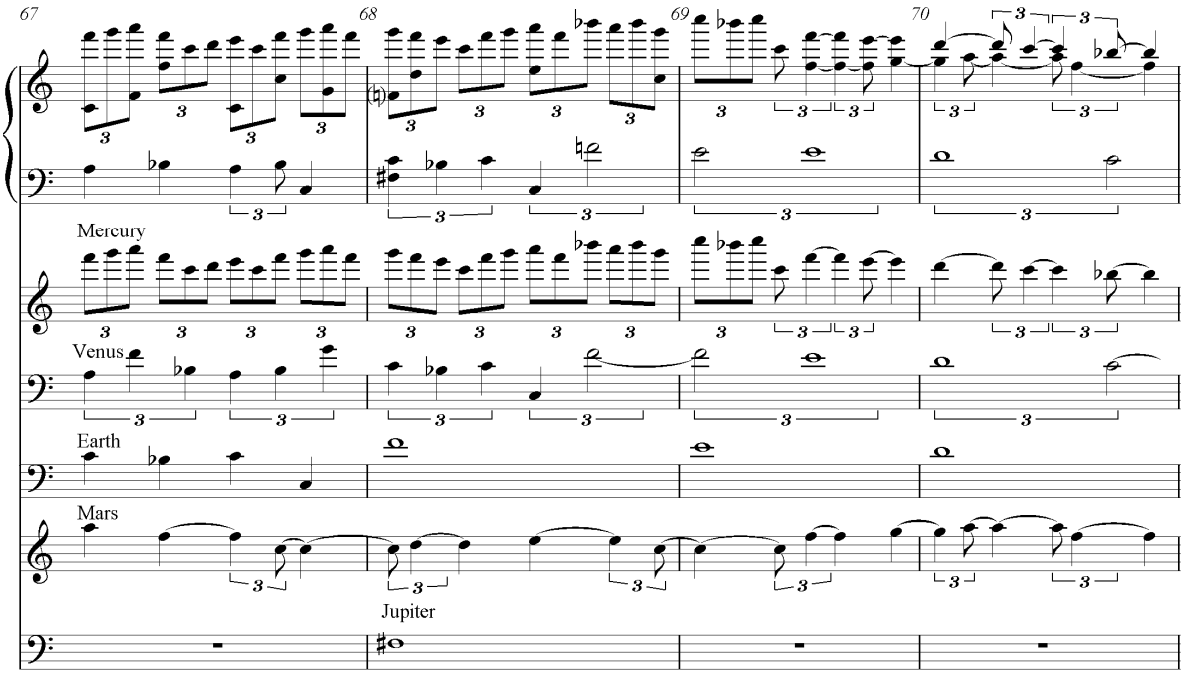


- Ranked according to their density from most to least dense, Mars, then Earth, then Venus, then Mercury appear during the fifth and last occurrence of MGV1 (15 bars long starting at bar 250). Earth the less dense starts at the same time as Mars to conclude within a period of 15 bars:



At times motives collide with each other. The disintegration motive of bar 203 annihilates the pitch belonging to MGV1/ Mars/ Brightness. I omitted the last pitch of MGV1/ Mars/ Brightness in bar 209 because it would spoil motive 7°. I omitted the pitches of MGV1/ Mars/ Size in the Sky and Density in bars 243, 244 and 246 because they would obscure motive 3°, ditto for MGV2 from bar 265 onwards. All Jovian pitches disappear during the coda.

For the carillonneur's benefit, I conflated contrapuntal voices. Example in bar 67 to 70, the top two staves reproduce the carillon part in the performance score, the bottom four staves the actual contrapuntal voices:



MGV2 appears three times without transformations, each time at a faster tempo (from ♩ = 120 to 130 to 140) and an octave higher. In bars 286 to 289, I used the codetta of MGV2 to modulate from Vanden Gheyn's F Major to the whole-tone motive of the coda.

7° The pitch durations of the planetary-rotation periods of the Jovian planets

The planetary-rotation period of the four large Jovian planets is approximately 12 years for Jupiter, 30 years for Saturn, 84 years for Uranus and 165 years for Neptune. I assigned 165 𝅗𝅥s + pitch B♭2 to Neptune, 84 𝅗𝅥s + D3 to Uranus, 30 𝅗𝅥s + E3 to Saturn and 12 𝅗𝅥s + F♯3 to Jupiter (see cover of the score). I omitted pitch C3 between Neptune and Uranus because C3 belongs to the family of C pitches (see above motive 1°). These Jovian pitches form a tetratonic whole tone scale. I positioned the starting time of the Jovian planets orbiting in bar 15 as a wink to the Planck era, the stretch of time between the hypothetical time zero and 10^{-43} seconds later!

8° The whole-tone motive of open fifth chords

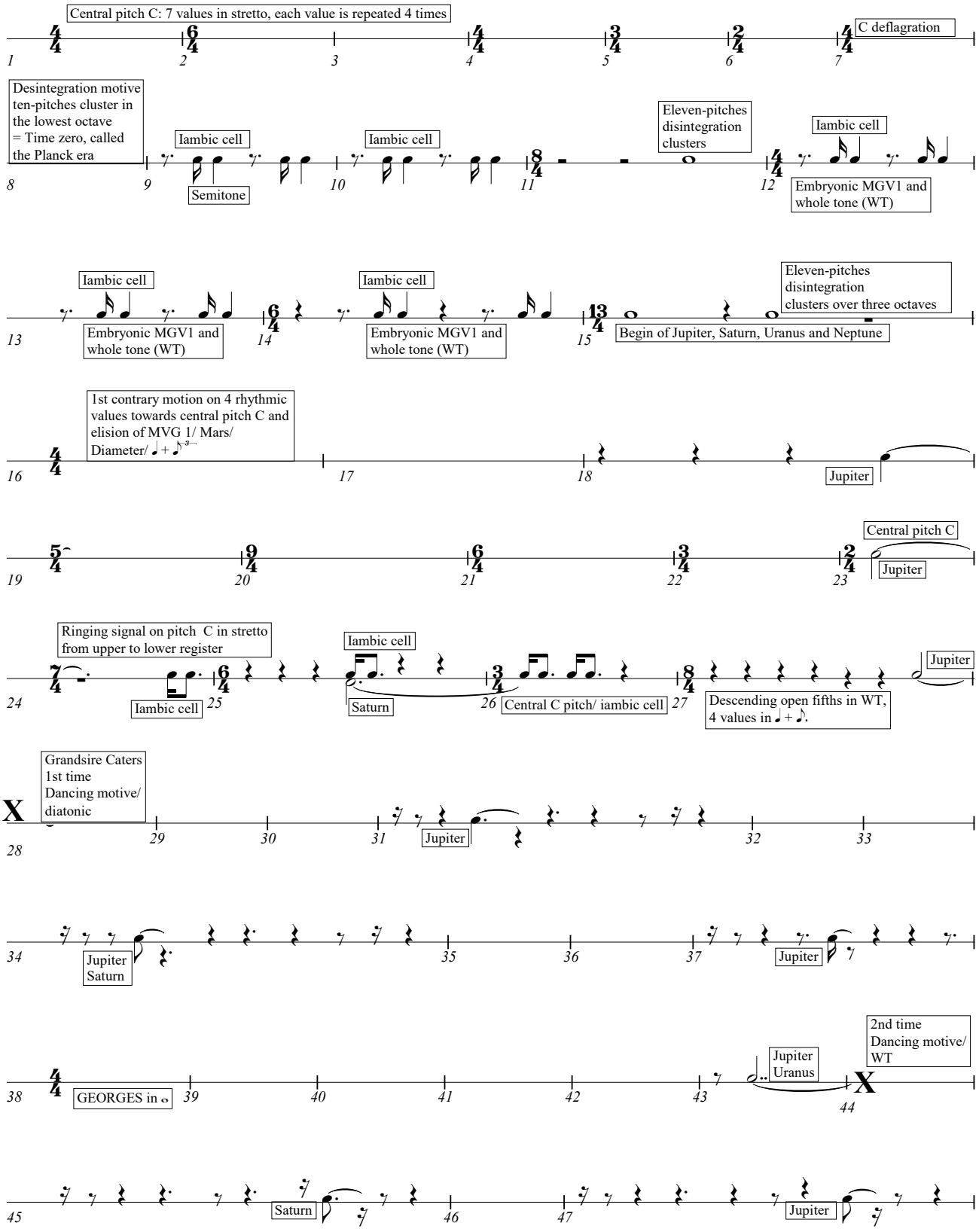
From the Jovian tetratonic whole tone scale, I generated a whole-tone motive of open fifth chords (first occurrence in bar 27). The first harmonic of bells being the minor third, I omitted major and minor thirds in this motive 8°. By avoiding the semitone perceived as a dissonance, whole-tones create a sense of suspension very much liked by Impressionists composers. The whole-tone scale motive within *΄ΑΠΕΙΡΟΝ* expresses the fact that on a cosmic scale, I am utterly meaningless. I am not even a dissonance. The number of open fifth increases from 4 in bar 27 to 5 to 6 to 7 to 8 in bar 243) whilst accelerating since their rhythmic values decrease each time by a 𝅘𝅥𝅯 (from 7𝅘𝅥𝅯s in bar 27 to 3 𝅘𝅥𝅯s in bar 243). I omitted the last pitch B♭2 at the end of bar 209, as it would sound like a massive Neptunian pitch in the wrong place. Having so far played mostly a transitional role, the Jovian tetratonic motive becomes the engine of the virtuosic climax in the coda from bar 290, growing vertically as well as horizontally, each entrance a whole tone higher until the carillon's upper limit at the end of bar 295.

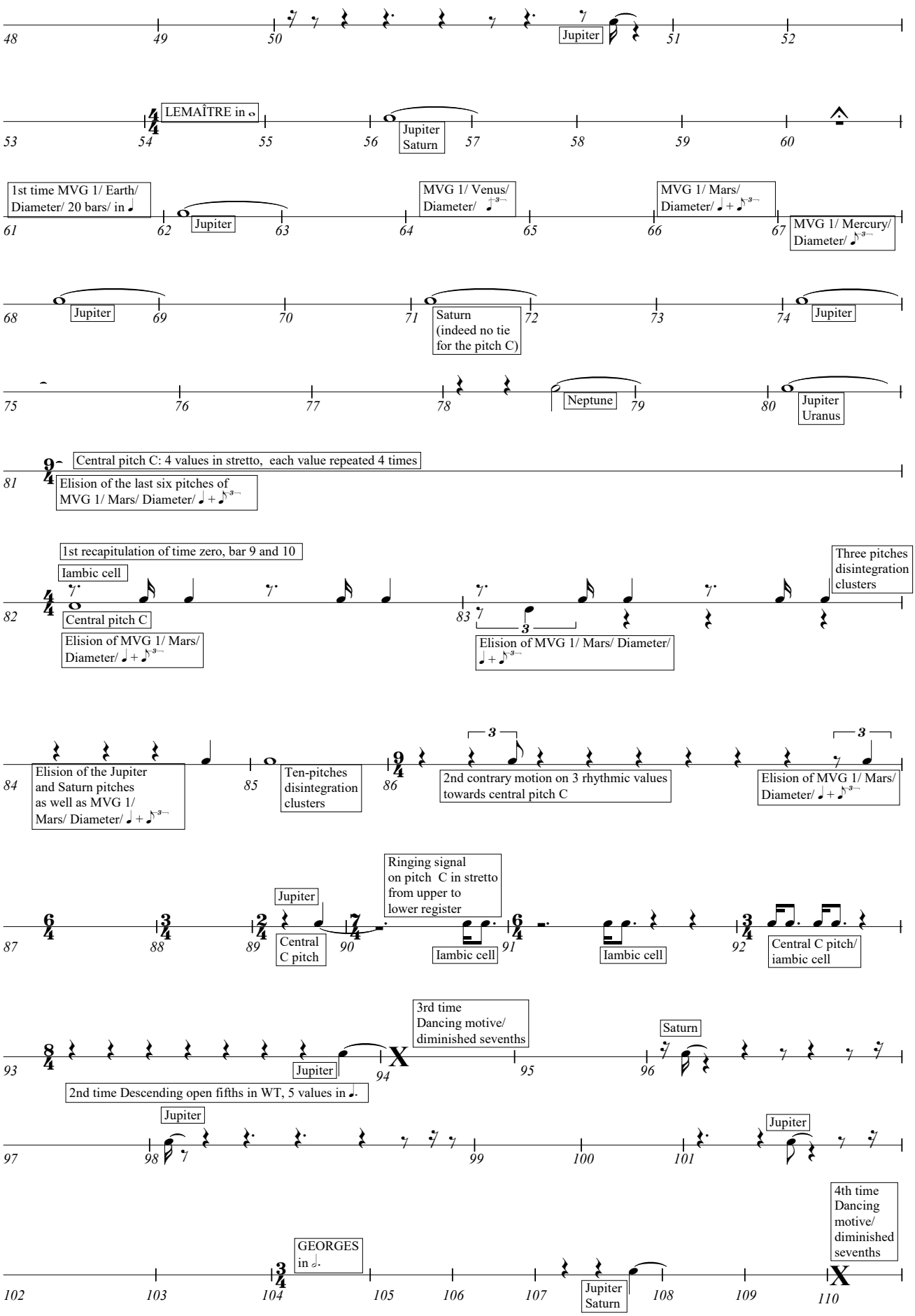
Chronological table of the musical material

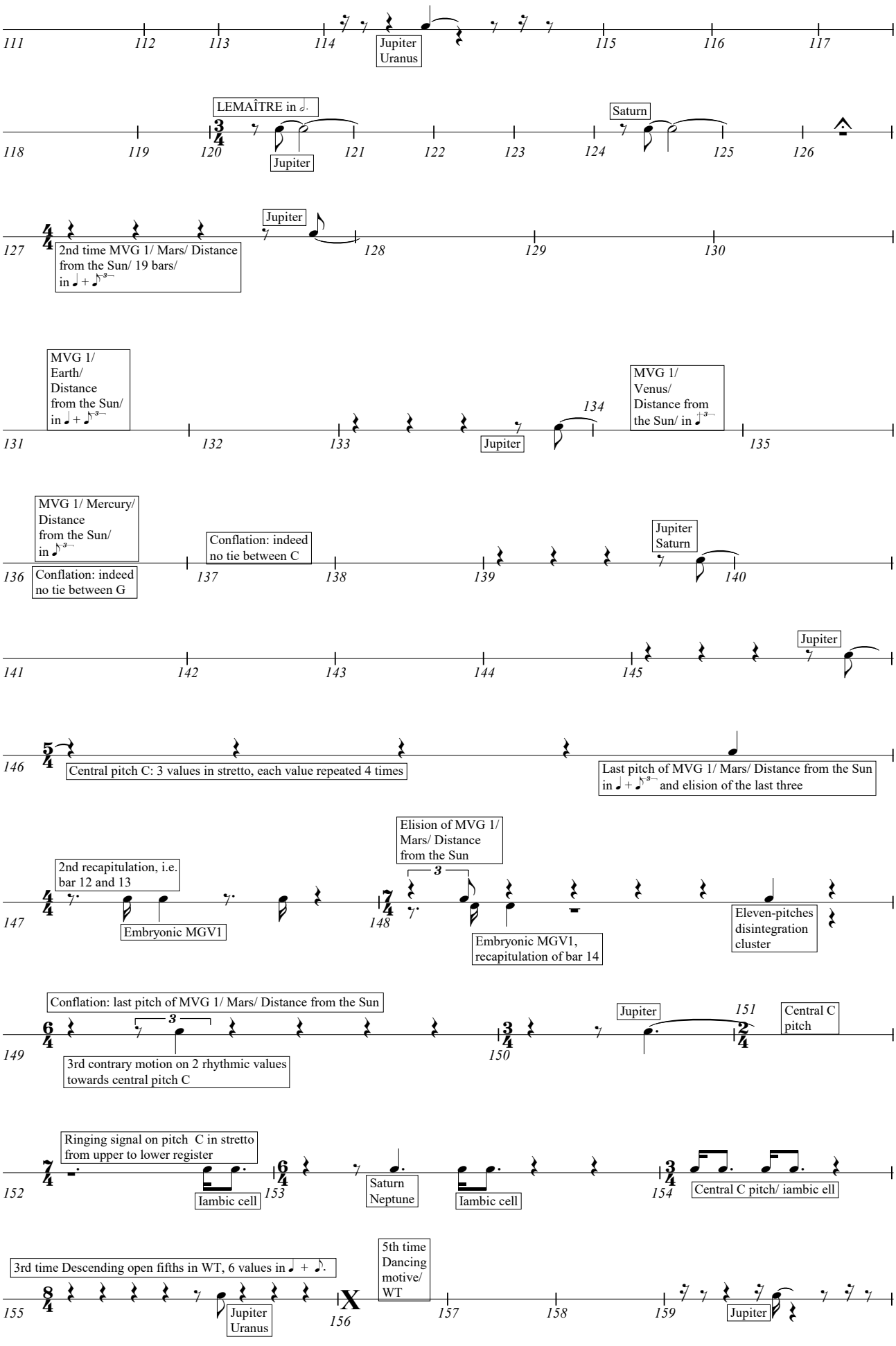
Rhapsody, the subtitle of the composition, refers to its structure:

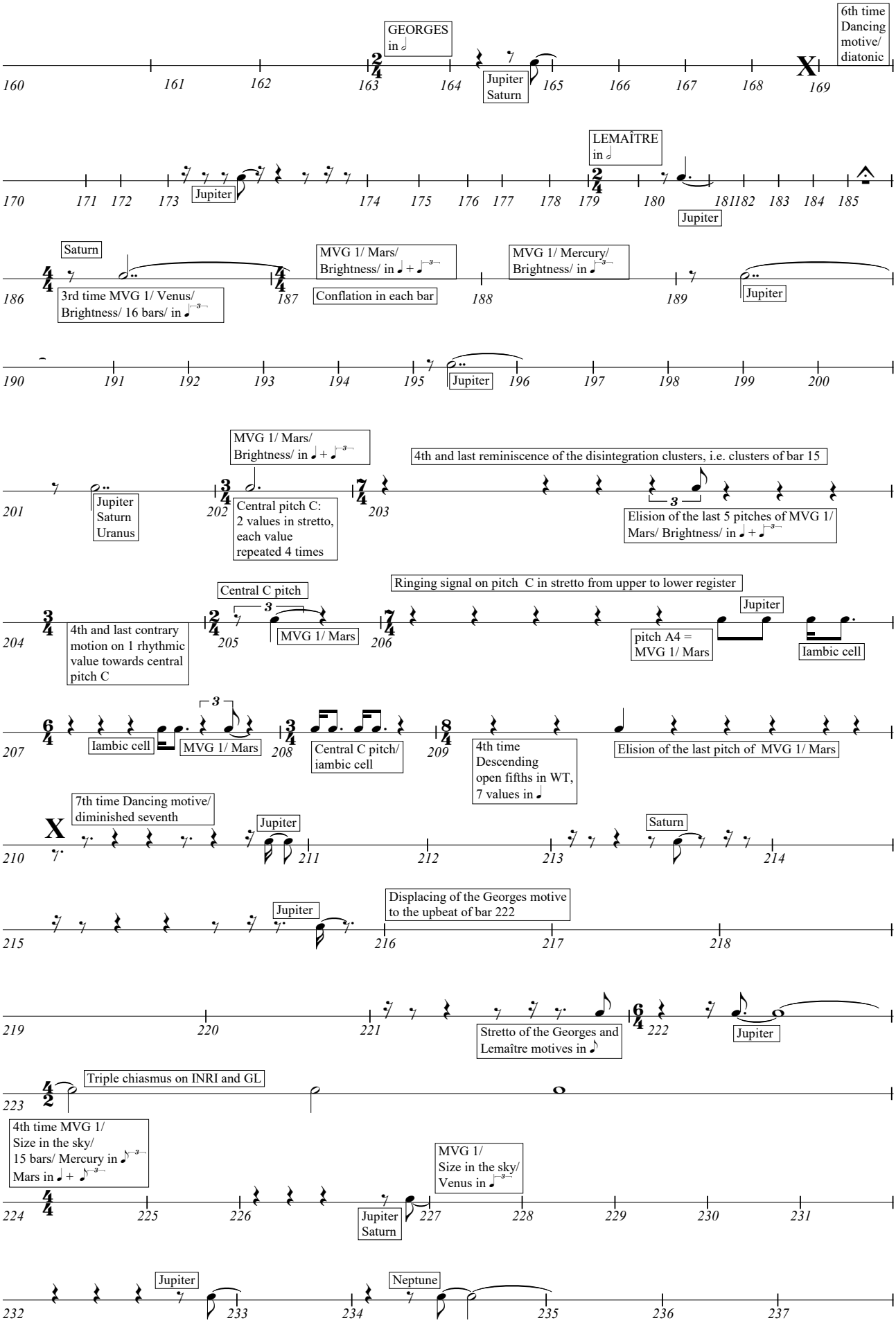
Bar #	Motive 1° Central pitch C (= C)	Motive 2° Disintegration clusters (= cl.)	Motive 3° Dancing motive (= Dnc.)	Motive 4° Georges Lemaître motive (= G. and L.)	Motive 5° Matthias Vanden Gheyn's quote with motive 6° Telluric planets (= MVG1)	MVG2	Motive 7° Jovian planets (= J. plnts.)	Motive 8° open fifth chords in whole-tone (= WT)
1	C @160							
8		cl.						
15							J. plnts. begin	
16	C							
27								WT
28			Dnc. (diatonic)					
38				G.				
44			Dnc. (WT)					
54				L.				
61					MVG1 Begin of the telluric planets @100			
81	C							
82		cl. @150						
86	C							
93								WT
94			Dnc. (𝄾)					
104				G.				
110			Dnc. (𝄾)					
120				L.				
127					MVG1 @90			
146	C							
147		cl. @140						
149	C							
155								WT
156			Dnc. (WT)					
163				G.				
169			Dnc. (diatonic)					
179				L.				
186					MVG1 @80			
202	C							
203		cl. @130						
204	C							
209								WT
210			Dnc. (𝄾)					
216			Dnc. (diatonic)					
222 and 223				G.L. @60				
223				*INRI* @60				
224					MVG1 @70			
239	C @120							
243								WT
244			Dnc. (WT)					
250					MVG1 @60			
264					End of the telluric planets			
265						MVG2 @120		
271	C							
272						MVG2 @130		
278	C							
280						MVG2 @140		
282							J. plnts. end	
286								WT@150
296	C							
300	Last bar							

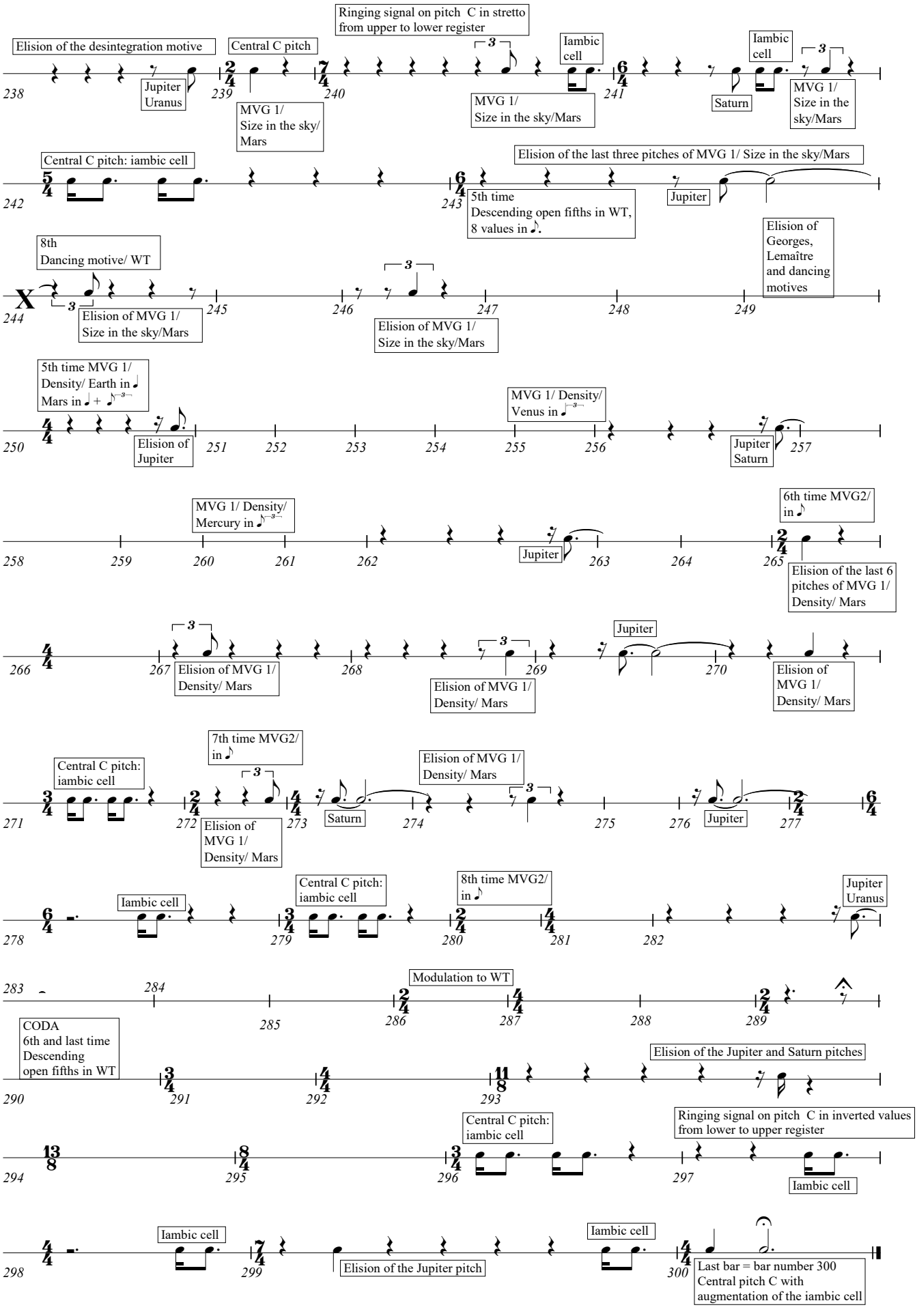
Bar by bar analysis




48
49
50
Jupiter
51
52
53
LEMAÎTRE in 𝅝
54
55
56
Jupiter
Saturn
57
58
59
60
1st time MVG 1/ Earth/ Diameter/ 20 bars/ in 𝅗𝅥
61
62
Jupiter
63
64
MVG 1/ Venus/ Diameter/
65
66
MVG 1/ Mars/ Diameter/ 𝅗𝅥 + 𝅘𝅥𝅯
67
MVG 1/ Mercury/ Diameter/ 𝅘𝅥𝅯
68
Jupiter
69
70
71
Saturn (indeed no tie for the pitch C)
72
73
74
Jupiter
75
76
77
78
Neptune
79
80
Jupiter
Uranus
81
Central pitch C: 4 values in stretto, each value repeated 4 times
Elision of the last six pitches of MVG 1/ Mars/ Diameter/ 𝅗𝅥 + 𝅘𝅥𝅯
1st recapitulation of time zero, bar 9 and 10
Iambic cell
Three pitches disintegration clusters
82
Central pitch C
Elision of MVG 1/ Mars/ Diameter/ 𝅗𝅥 + 𝅘𝅥𝅯
83
Elision of MVG 1/ Mars/ Diameter/ 𝅗𝅥 + 𝅘𝅥𝅯
84
Elision of the Jupiter and Saturn pitches as well as MVG 1/ Mars/ Diameter/ 𝅗𝅥 + 𝅘𝅥𝅯
85
Ten-pitches disintegration clusters
86
2nd contrary motion on 3 rhythmic values towards central pitch C
Elision of MVG 1/ Mars/ Diameter/ 𝅗𝅥 + 𝅘𝅥𝅯
87
88
89
Jupiter
Central C pitch
90
Ringing signal on pitch C in stretto from upper to lower register
91
Iambic cell
Iambic cell
92
Central C pitch/ iambic cell
93
Jupiter
94
3rd time Dancing motive/ diminished sevenths
95
96
Saturn
2nd time Descending open fifths in WT, 5 values in 𝅗𝅥.
97
Jupiter
98
99
100
101
Jupiter
4th time Dancing motive/ diminished sevenths
GEORGES in 𝅗𝅥.
102
103
104
105
106
107
Jupiter
Saturn
108
109
110


111
112
113
114
Jupiter
Uranus
115
116
117
LEMAÎTRE in ♩.
118
119
120
Jupiter
121
122
123
Saturn
124
125
126
127
Jupiter
2nd time MVG 1/ Mars/ Distance from the Sun/ 19 bars/ in ♩ + ♪³
128
129
130
MVG 1/ Earth/ Distance from the Sun/ in ♩ + ♪³
131
132
133
Jupiter
134
MVG 1/ Venus/ Distance from the Sun/ in ♩³
135
MVG 1/ Mercury/ Distance from the Sun/ in ♪³
136
Conflation: indeed no tie between G
Conflation: indeed no tie between C
137
138
139
Jupiter
Saturn
140
141
142
143
144
145
Jupiter
146
Central pitch C: 3 values in stretto, each value repeated 4 times
Last pitch of MVG 1/ Mars/ Distance from the Sun in ♩ + ♪³ and elision of the last three
2nd recapitulation, i.e. bar 12 and 13
147
Embryonic MGV1
Elision of MVG 1/ Mars/ Distance from the Sun
148
Embryonic MGV1, recapitulation of bar 14
Eleven-pitches disintegration cluster
Conflation: last pitch of MVG 1/ Mars/ Distance from the Sun
149
3rd contrary motion on 2 rhythmic values towards central pitch C
150
Jupiter
151
Central C pitch
Ringing signal on pitch C in stretto from upper to lower register
152
Iambic cell
153
Saturn
Neptune
Iambic cell
154
Central C pitch/ iambic ell
3rd time Descending open fifths in WT, 6 values in ♩ + ♪.
155
Jupiter
Uranus
156
5th time Dancing motive/ WT
157
158
159
Jupiter


GEORGES in 𝅗𝅥
6th time Dancing motive/ diatonic
Jupiter Saturn
LEMAÎTRE in 𝅗𝅥
Jupiter
Saturn
3rd time MVG 1/ Venus/ Brightness/ 16 bars/ in ♩
MVG 1/ Mars/ Brightness/ in ♩ + ♩
Conflation in each bar
MVG 1/ Mercury/ Brightness/ in ♩
Jupiter
Jupiter
MVG 1/ Mars/ Brightness/ in ♩ + ♩
4th and last reminiscence of the disintegration clusters, i.e. clusters of bar 15
Jupiter Saturn Uranus
Central pitch C: 2 values in stretto, each value repeated 4 times
Elision of the last 5 pitches of MVG 1/ Mars/ Brightness/ in ♩ + ♩
Central C pitch
Ringing signal on pitch C in stretto from upper to lower register
4th and last contrary motion on 1 rhythmic value towards central pitch C
MVG 1/ Mars
Jupiter
pitch A4 = MVG 1/ Mars
Iambic cell
Iambic cell
MVG 1/ Mars
Central C pitch/ iambic cell
4th time Descending open fifths in WT, 7 values in ♩
Elision of the last pitch of MVG 1/ Mars
7th time Dancing motive/ diminished seventh
Jupiter
Saturn
Jupiter
Displacing of the Georges motive to the upbeat of bar 222
Stretto of the Georges and Lemaître motives in 𝅘𝅥𝅯
Jupiter
Triple chiasmus on INRI and GL
4th time MVG 1/ Size in the sky/ 15 bars/ Mercury in 𝅘𝅥𝅯 Mars in ♩ + 𝅘𝅥𝅯
MVG 1/ Size in the sky/ Venus in ♩
Jupiter Saturn
Jupiter
Neptune


Elision of the desintegration motive
Jupiter
Uranus
Central C pitch
MVG 1/
Size in the sky/
Mars
Ringing signal on pitch C in stretto
from upper to lower register
MVG 1/
Size in the sky/Mars
Iambic
cell
Saturn
Iambic
cell
MVG 1/
Size in the
sky/Mars
Central C pitch: iambic cell
Elision of the last three pitches of MVG 1/ Size in the sky/Mars
Jupiter
5th time
Descending open fifths in WT,
8 values in
8th
Dancing motive/ WT
Elision of MVG 1/
Size in the sky/Mars
Elision of MVG 1/
Size in the sky/Mars
Elision of
Georges,
Lemaître
and dancing
motives
5th time MVG 1/
Density/ Earth in
Mars in +
Elision of
Jupiter
MVG 1/ Density/
Venus in
Jupiter
Saturn
MVG 1/ Density/
Mercury in
Jupiter
6th time MVG2/
in
Elision of the last 6
pitches of MVG 1/
Density/ Mars
Elision of MVG 1/
Density/ Mars
Elision of MVG 1/
Density/ Mars
Jupiter
Elision of
MVG 1/
Density/ Mars
Central C pitch:
iambic cell
7th time MVG2/
in
Elision of
MVG 1/
Density/ Mars
Saturn
Elision of MVG 1/
Density/ Mars
Jupiter
Iambic cell
Central C pitch:
iambic cell
8th time MVG2/
in
Jupiter
Uranus
Modulation to WT
CODA
6th and last time
Descending
open fifths in WT
Elision of the Jupiter and Saturn pitches
Central C pitch:
iambic cell
Ringing signal on pitch C in inverted values
from lower to upper register
Iambic cell
Iambic cell
Elision of the Jupiter pitch
Iambic cell
Last bar = bar number 300
Central pitch C with
augmentation of the iambic cell

Mind(less?) games

I argue that most important in a piece of music is the story told by the composer in the sense that the music acts as an agent of emotional change for the listener: emotion sets you in motion. In art, accuracy is not truth. Hence, in *΄ΑΠΕΙΡΟΝ*, I have taken a number of liberties with science.

1* The disintegration process starts from pitch C5. This pitch is the exact centre of the range of the carillon and initially develops in a mirror motion. However, the primeval atom could not have been the centre of anything, as the process of disintegration itself created space and time. Moreover, pitch C is not the centre of each carillon, as range and intonation differ, but then the solar system is far from being the only existing planetary system.

2* I positioned the starting time of the Jovian planets orbiting in bar 15 as a wink to the Planck era, i.e. the stretch of time between the hypothetical time zero and 10^{-43} seconds later. The location of this starting time was the toughest compositional decision to take, as it determined all subsequent pitch collisions.

3* I rounded up the values of the planetary-rotation periods of the four telluric planets and those of the planetary-rotation periods of the four large Jovian planets. Even if the ratios are correct, I also had to round up the rhythmic values assigned to the four telluric planets. The simplification of these rhythmic values ensured that the rhythms are playable by a carillonneur as opposed to a MIDI playback.

4* Logically, I should have assigned to the Jovian planets a number of ♩ s instead of 𝅗𝅥 s. However, halving the number of Jovian pitches in the carillon's lowest register lightened the discourse unfolding in the manual.

5* Strictly speaking, to position accurately the pitches of the Jovian planets I should have taken into account all the tempo variations. Such mathematic calculations are feasible but meaningless in the context of tempi played by a performer furthermore from a bell tower.

6* The dancing motive marked *leggiero e giocoso* expresses my enthusiasm for space exploration and for bells. Yet surely, matter does not frolic in space. My childlike eyes still marvel at the elegant lightness of astronauts floating in outer space.

7* The precise order of entry of each telluric planet is a debatable instance of anthropomorphism. Even if Vanden Gheyn's quoted music stays within tonic and dominant, it was a challenge to create five invertible counterpoints that were playable.

8* The idea behind the triple reappearance of the disintegration motive in *stretto* is the cosmic microwave background, i.e. the radiation that was released when the universe cooled down and that can still be detected today. The idea behind the slower tempo at each reappearance is the deceleration of the universe's expansion (see next point).

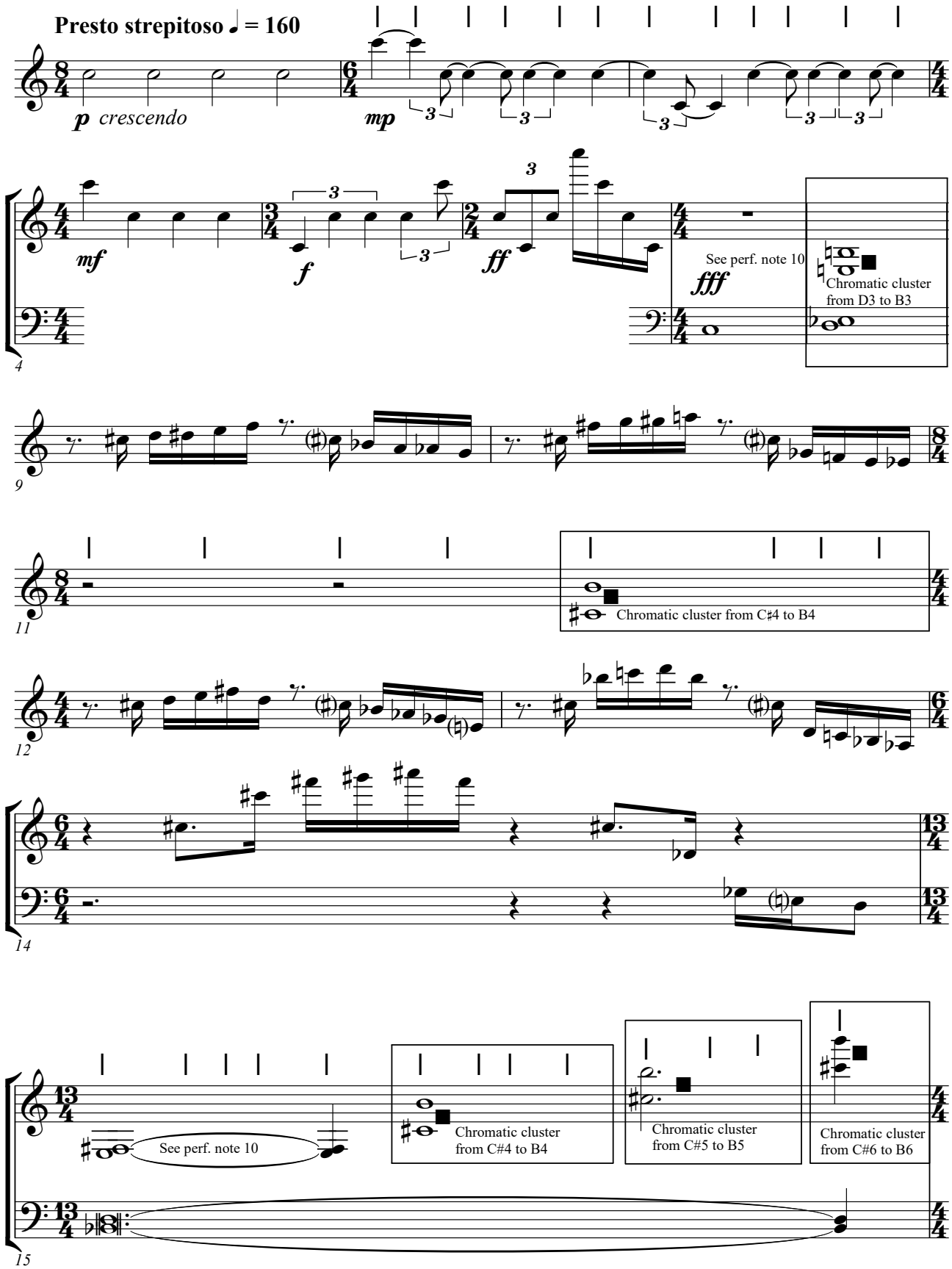
9* *Stretto* or not? Does the rate of expansion of the universe accelerate or decelerate? Should the musical material in *΄ΑΠΕΙΡΟΝ* undergo a process of liquidation/elision/*stretto* or in reverse be amplified and augmented? Lemaître postulated that the origin of the universe had three phases: a cosmic shock which disintegrated a "primeval atom" (his term) and enabled a rapid expansion, followed by a long period of cooling down cum decelerating expansion, followed by a second rapid expansion. Broadly speaking the curve of my tempi follow this model of deceleration (tempi of motives 1°, 2°, 3°, 4° and 8° ♩ = 160→150→140→130→120 and motive 5° ♩ =100→90→80→70→60), followed by an acceleration at the end ♩ = 120→130→140→150. The current prevalent theory called Big Crunch postulates that the expansion will reverse until an ultimate implosion, hence the augmentation of the iambic cell in the last bar 300. Composers like to create expectation, and then contradict that expectation. The way the human brain processes information privileges ellipse. We love ellipses and a certain amount of ambiguity that creates pleasure: in art, if *bis repetita placent*, thrice does become boring. Therefore, I chose to tighten motives as they reappear until I omit them (omission of the disintegration clusters between bars 237 and 238/ omission of the Georges Lemaître and dancing motives between bars 249 and 250/ omission of the pitches of the Jovian planets during the coda).

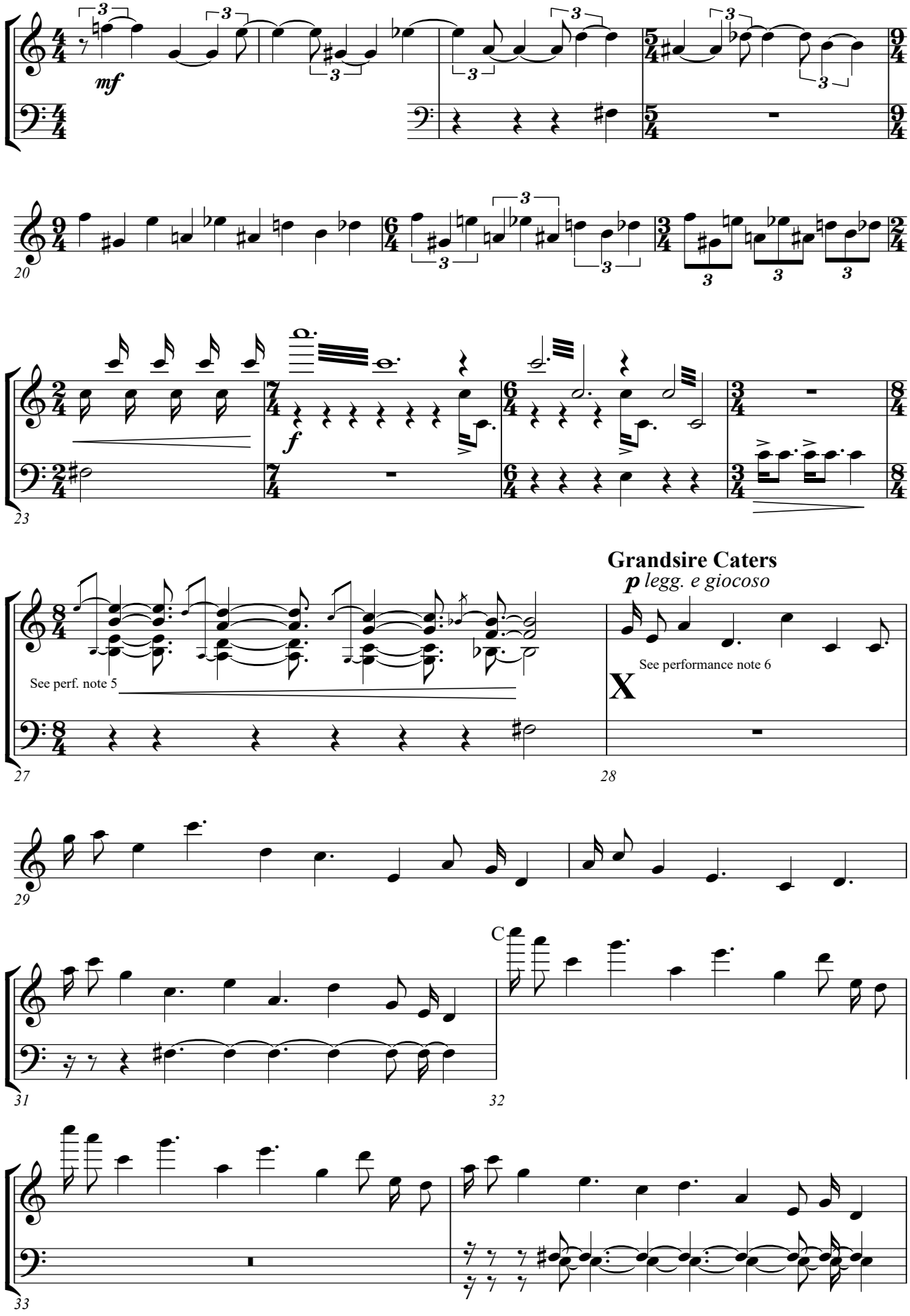
10* I would not show hubris by comparing my numerical games within *΄ΑΠΕΙΡΟΝ* with Lemaître's fondness and talent in numerical analysis. I do not adhere to the common belief that numbers and pleasure are antithetical: in fact, numbers contain endless possibilities for inspiration, metamorphoses and dreams. Listen to the rhythmic permutations of ringing church bells. I like to play mind games with numbers as long as the music does not look good paper at the expense of its sonic reality. One can look for numerical metaphors until one forces numbers to speak. Yet, when inspiration and math fit together, the effect is exhilarating:

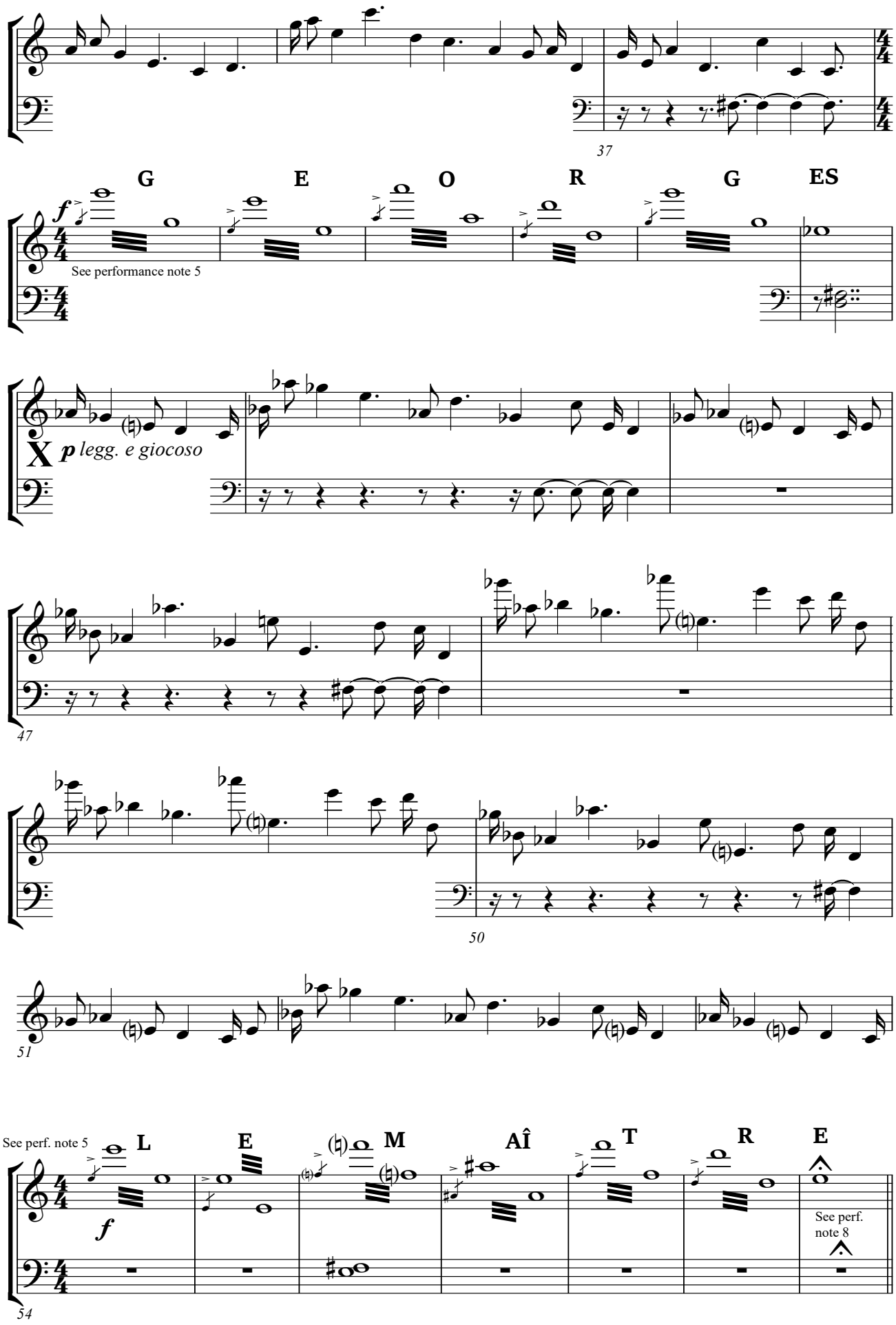
- Eight is the number of planets in the solar system, as it is the number of motives as well as the number of times the dancing motive, the GL/INRI motive and the MGV quotes appear in the composition. Eight is the number of open fifth in its final appearance. Eight four is the time signature of bar 295 that covers the entire range of the four-octave carillon.
- 223 is the bar number for Lemaître's double calling. 223 in a Trinitarian digit, as 2+2+3 = 7, the biblical number for completeness.
- The total number of pitches assigned to the Georges and Lemaître motives amounts to 128 in reference to the 128th anniversary of his birth.
- The score consists of 300 bars in reference to the 300th anniversary of Matthias Vanden Gheyn's birth.

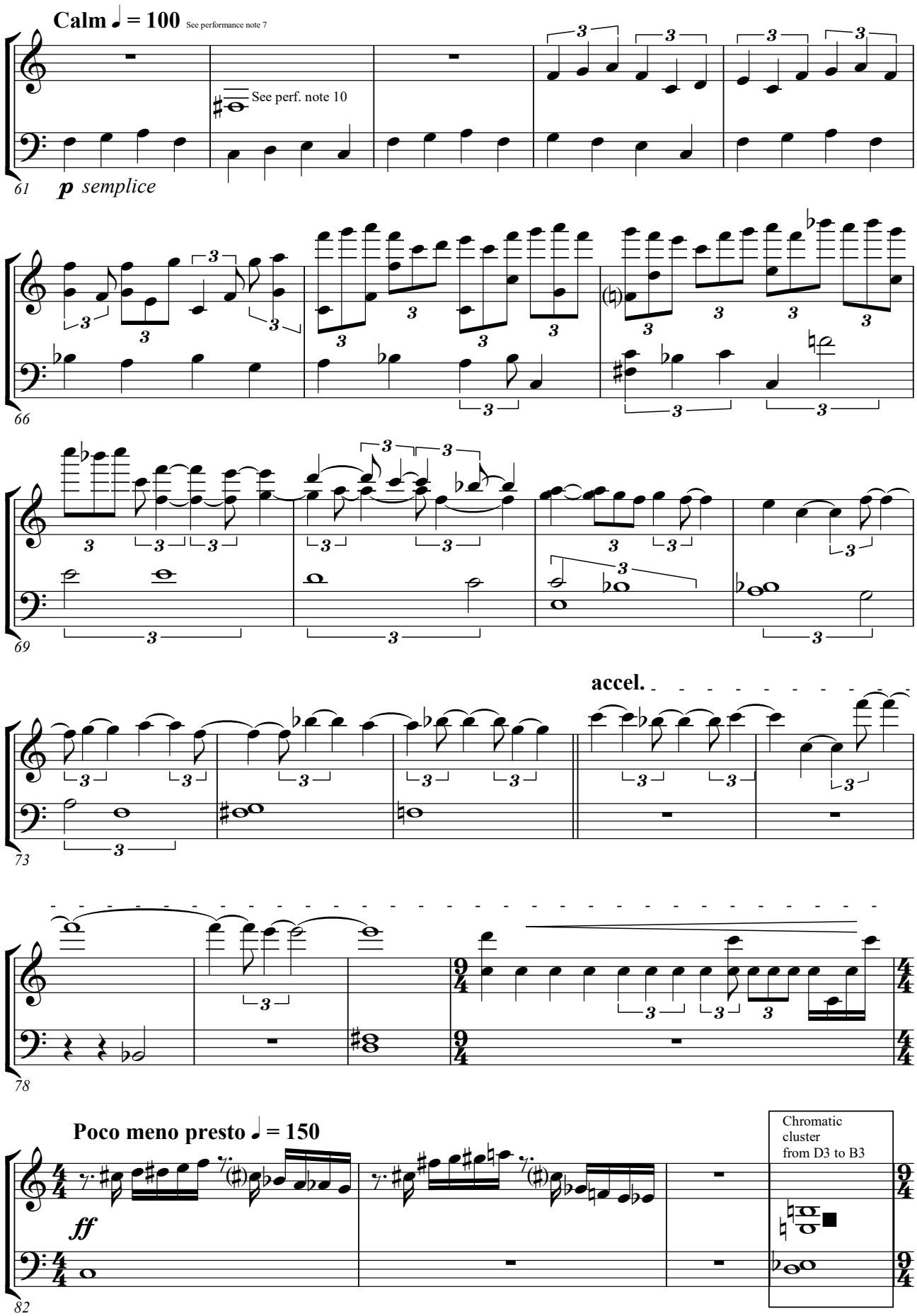
΄ΑΠΕΙΡΟΝ

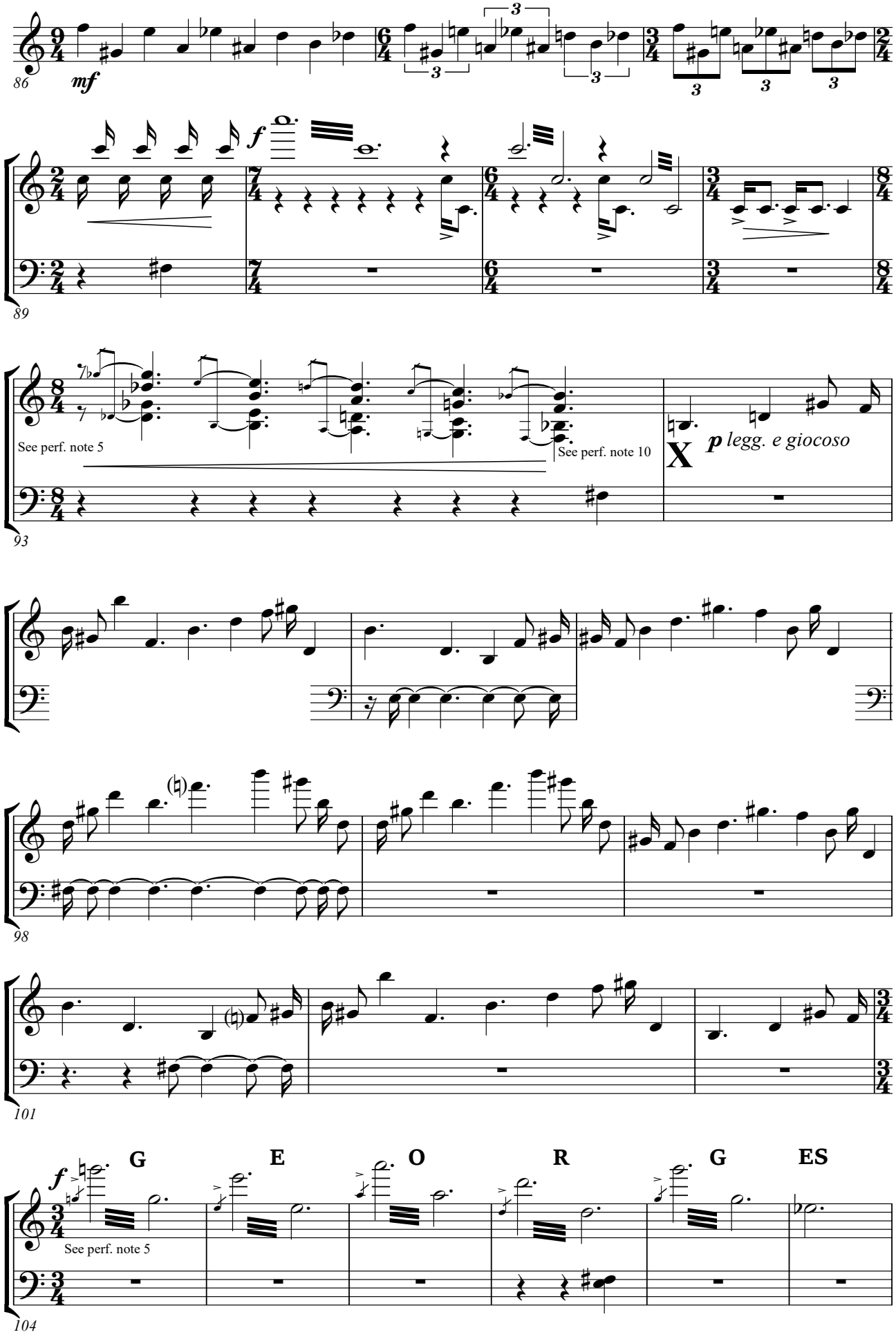
Cosmological rhapsody opus 130 for carillon

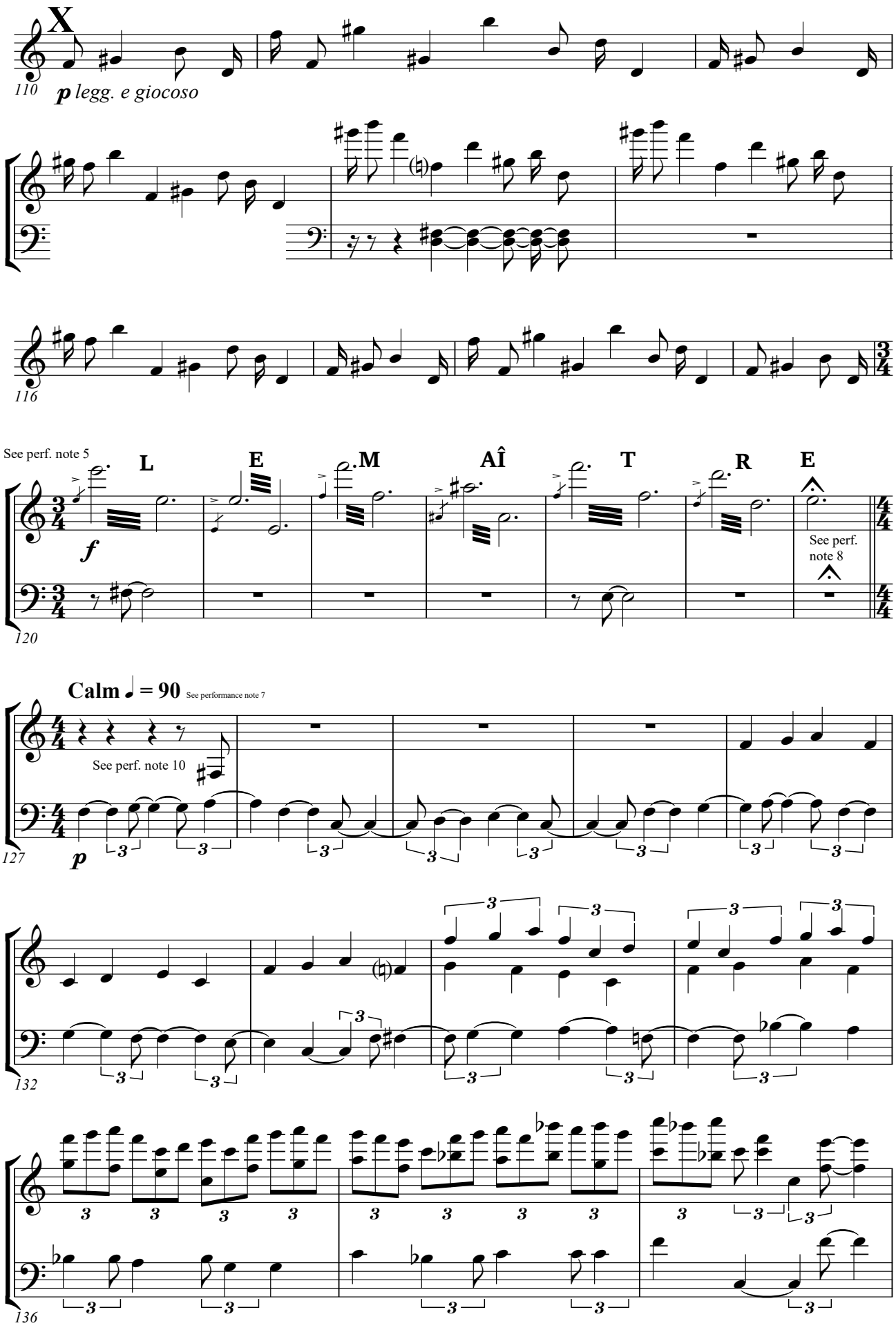


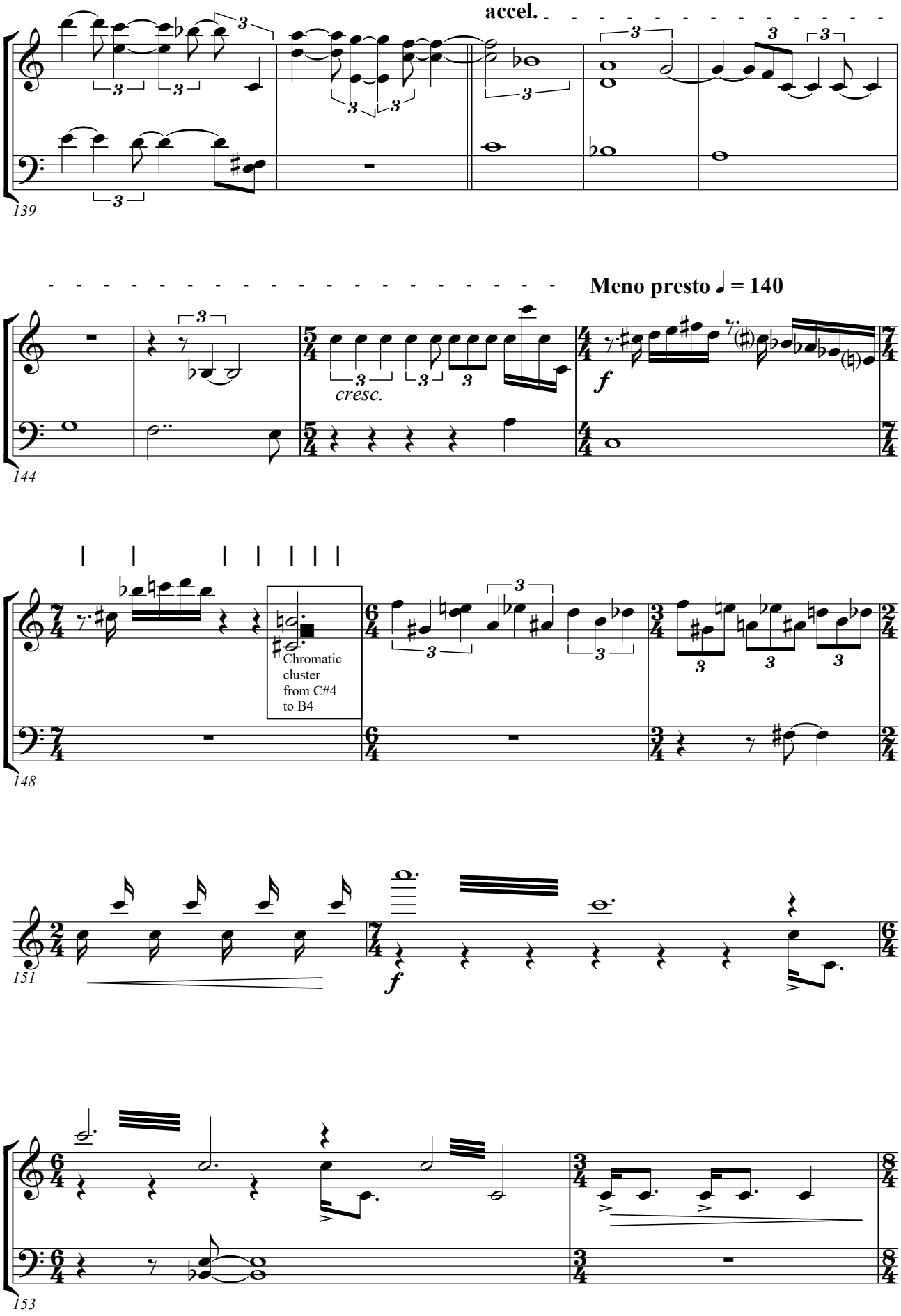

mf
20
f
23
Grandsire Caters
p legg. e giocoso
See perf. note 5
See performance note 6
X
27
28
29
C
31
32
33

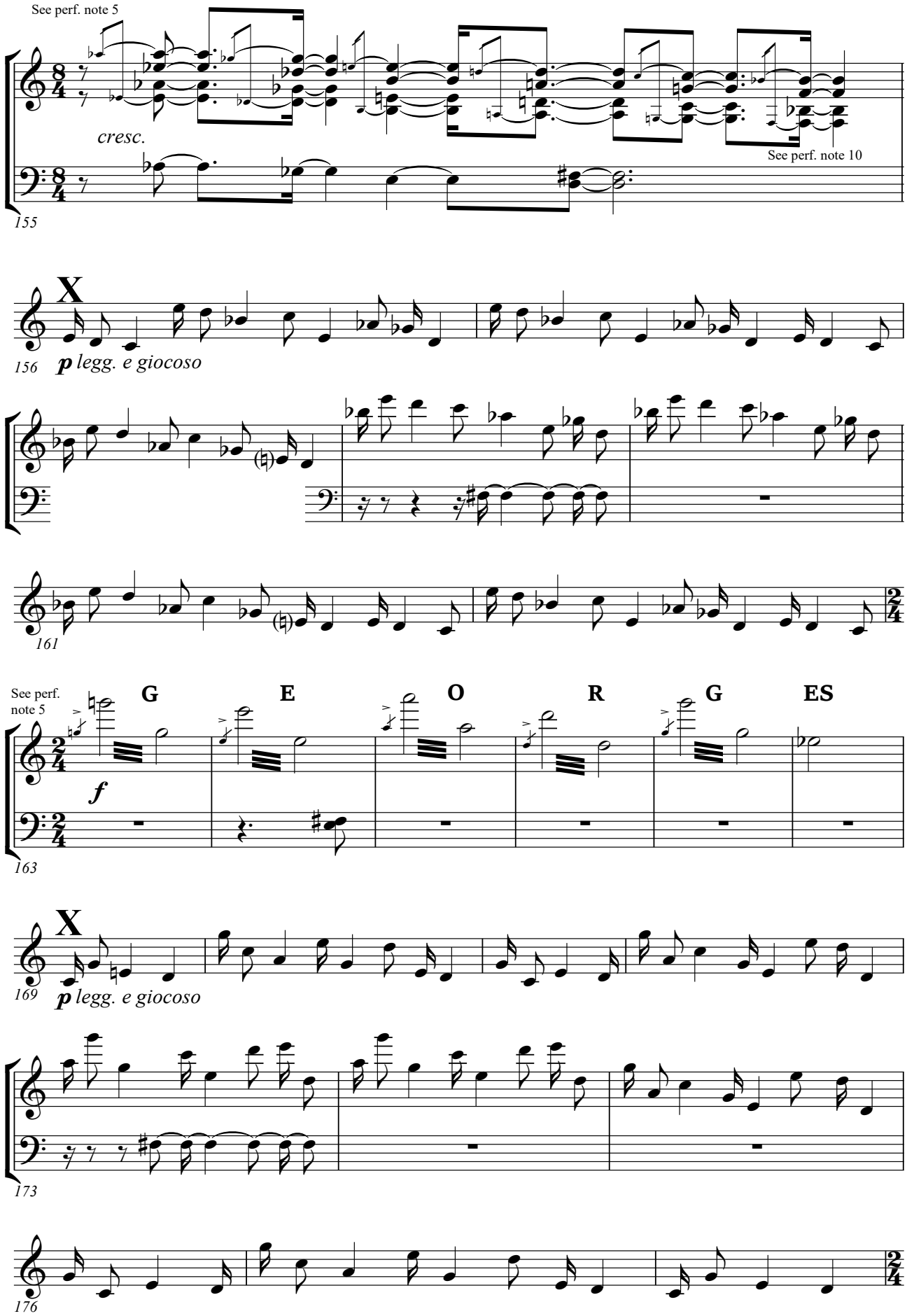

37
G E O R G ES
f
See performance note 5
X p legg. e giocoso
47
50
51
See perf. note 5
L E M AÎ T R E
f
See perf. note 8
54

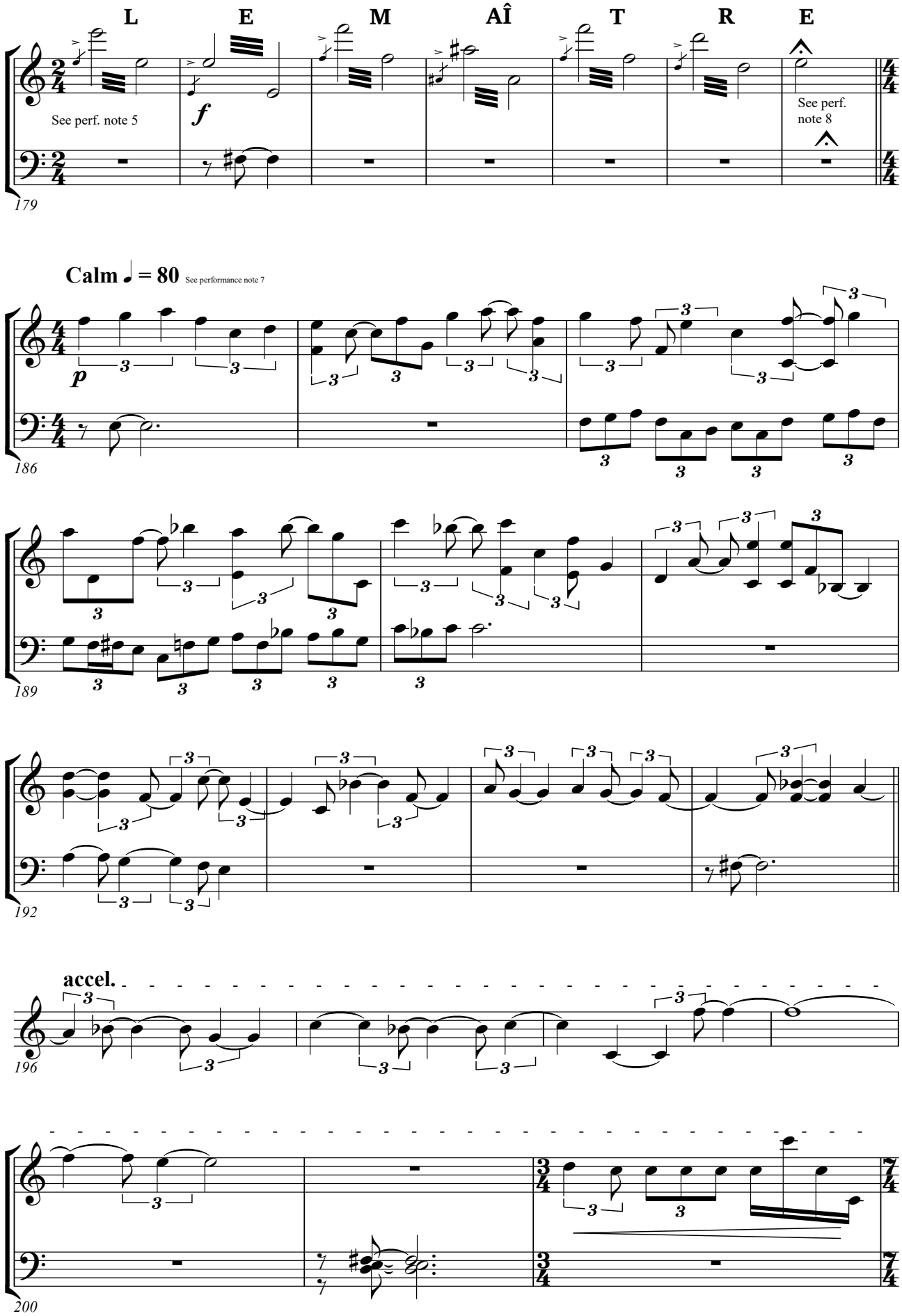

Calm ♩ = 100
See performance note 7
See perf. note 10
61
p semplice
66
69
accel.
73
78
Poco meno presto ♩ = 150
ff
Chromatic cluster from D3 to B3
82

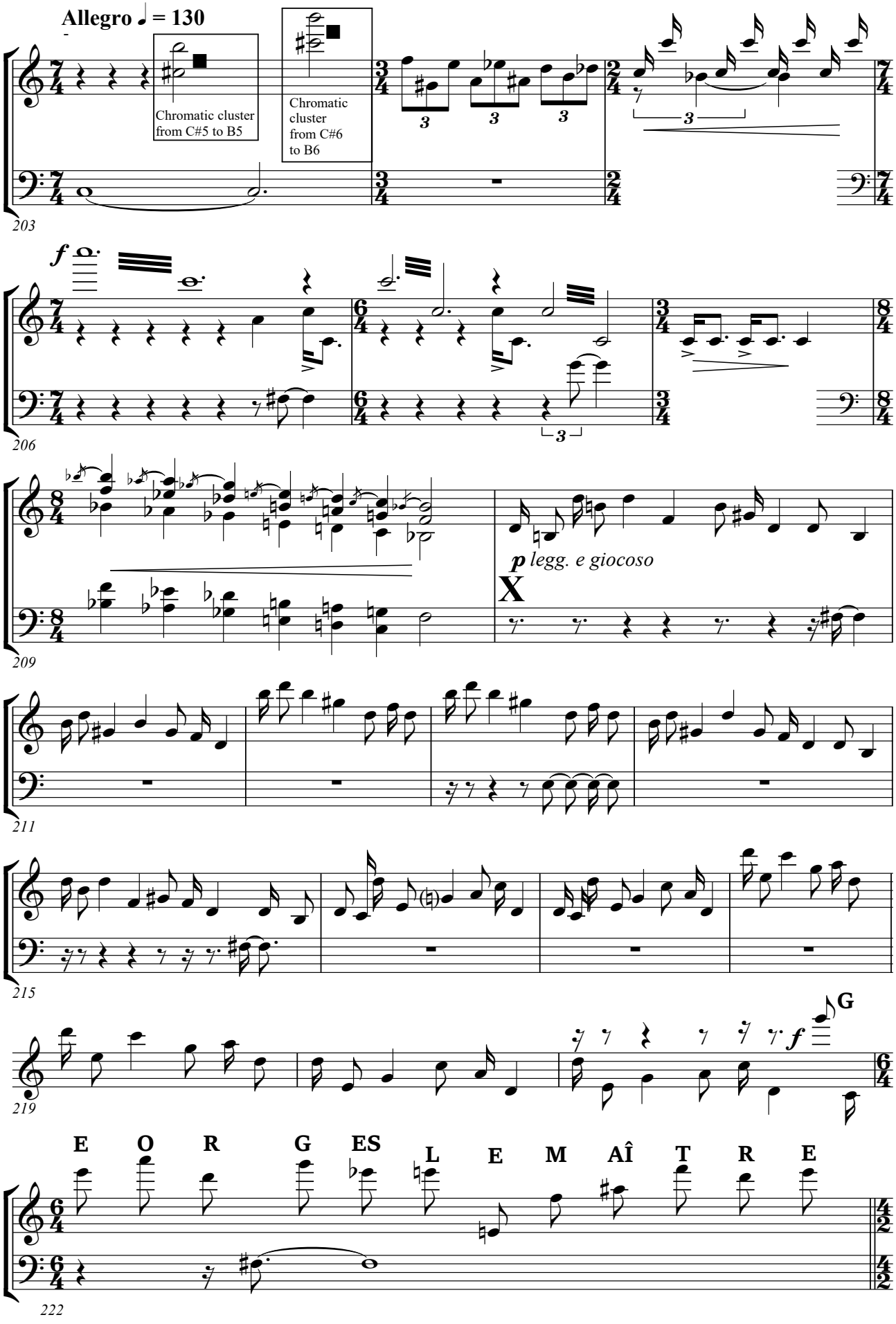

86
mf
89
f
93
See perf. note 5
See perf. note 10
X
p legg. e giocoso
98
101
104
f
G
E
O
R
G
ES
See perf. note 5

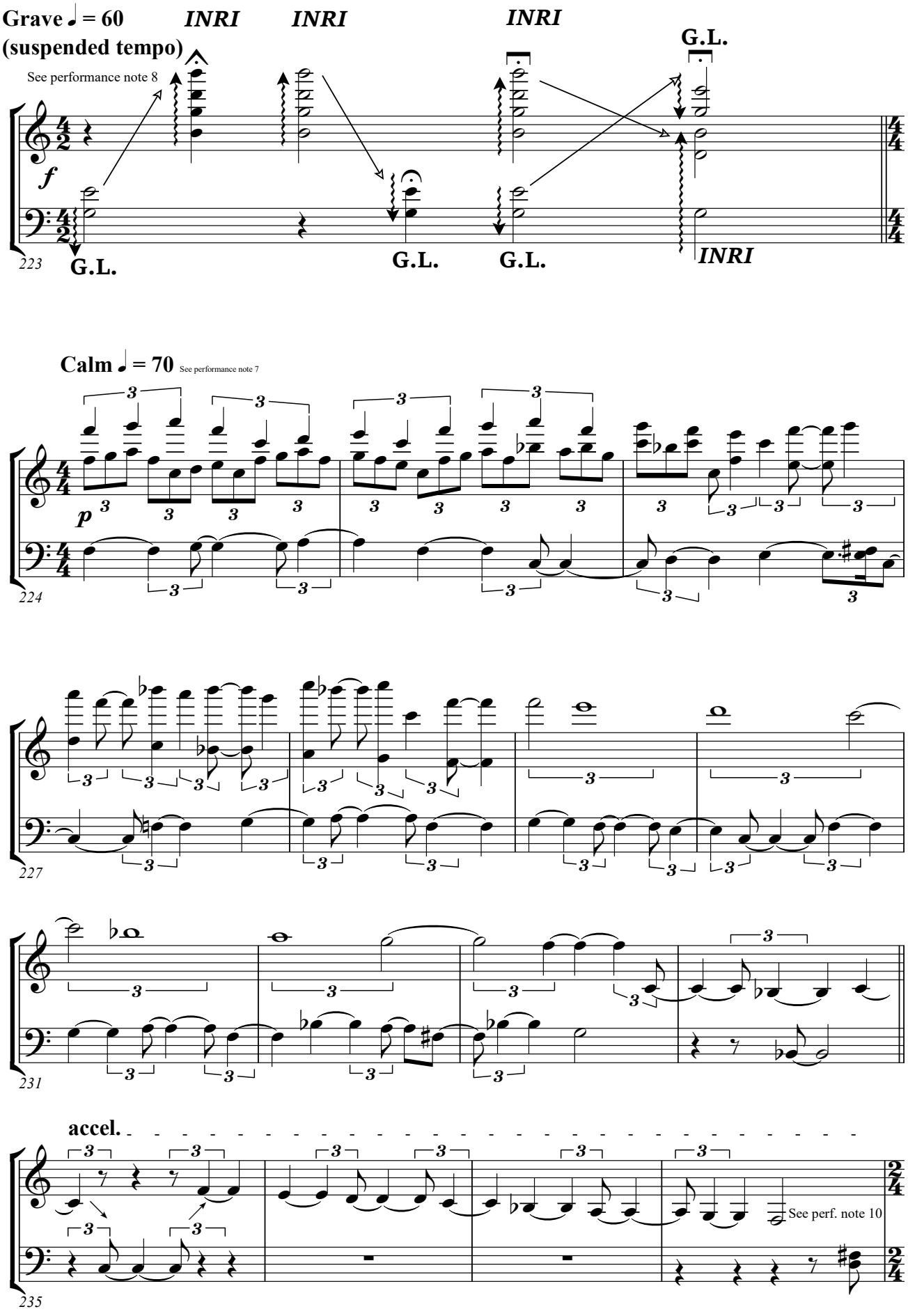

X
110
p legg. e giocoso
116
See perf. note 5
L E M AÎ T R E
f
See perf. note 8
120
Calm ♩ = 90 See performance note 7
See perf. note 10
127
p
132
136


accel.
139
Meno presto ♩ = 140
cresc.
f
144
Chromatic cluster from C#4 to B4
148
151
f
153

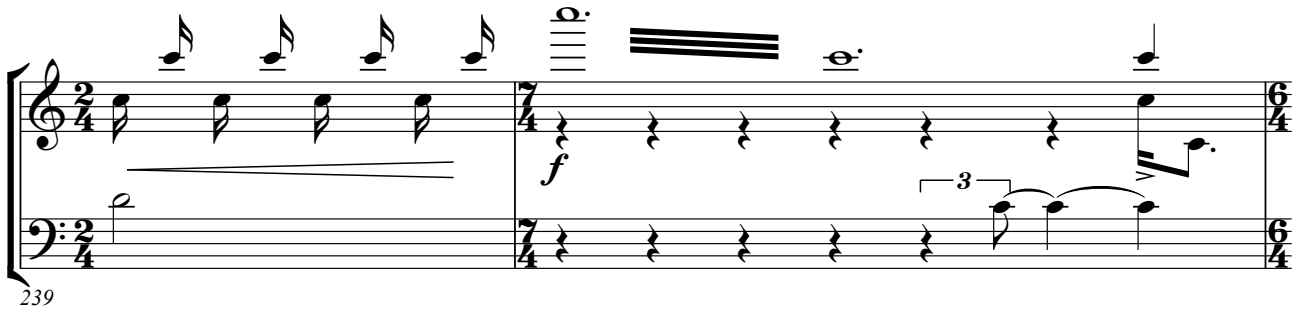

See perf. note 5
cresc.
See perf. note 10
155
X
156
p legg. e giocoso
161
See perf. note 5
G E O R G ES
f
163
X
169
p legg. e giocoso
173
176

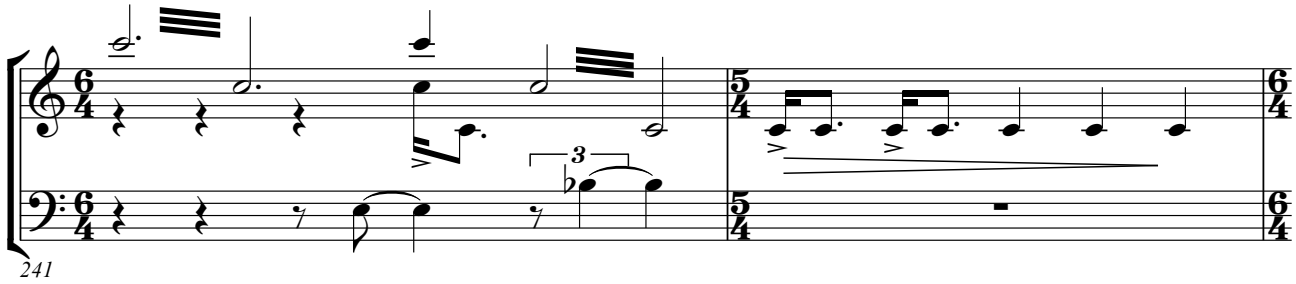

L E M AÎ T R E
See perf. note 5
See perf. note 8
179
Calm ♩ = 80 See performance note 7
186
189
192
accel.
196
200

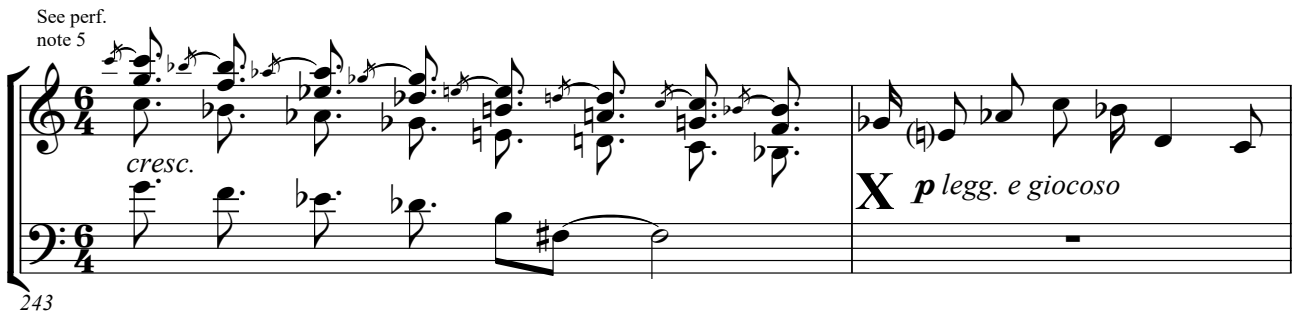

Allegro ♩ = 130
Chromatic cluster from C#5 to B5
Chromatic cluster from C#6 to B6
203
f
206
p legg. e giocoso
X
209
211
215
219
G
E O R G ES L E M AÎ T R E
222

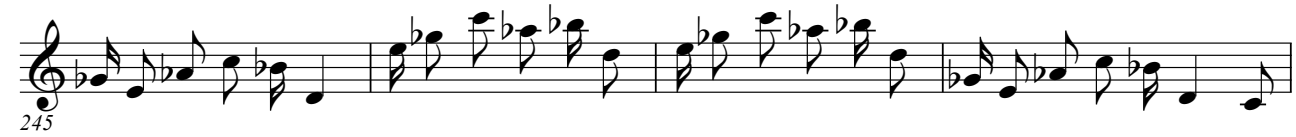

Grave ♩ = 60
(suspended tempo)
See performance note 8
INRI
INRI
INRI
G.L.
G.L.
G.L.
G.L.
INRI
223
Calm ♩ = 70
See performance note 7
224
227
231
accel.
See perf. note 10
235

Allegro ♩ = 120

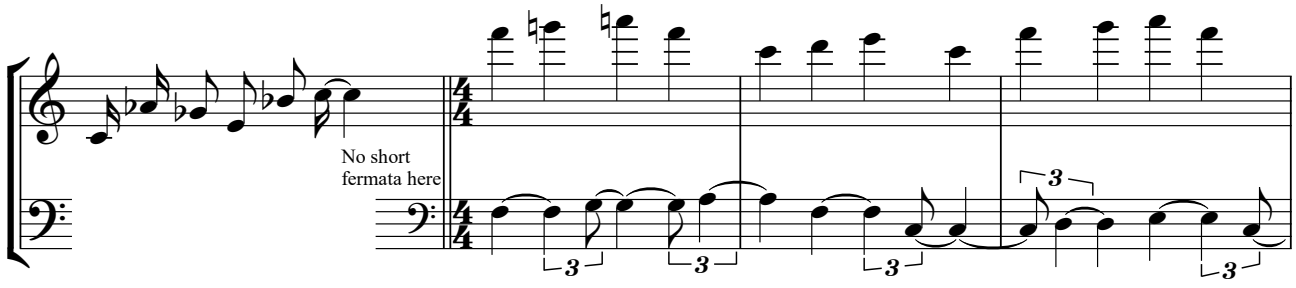


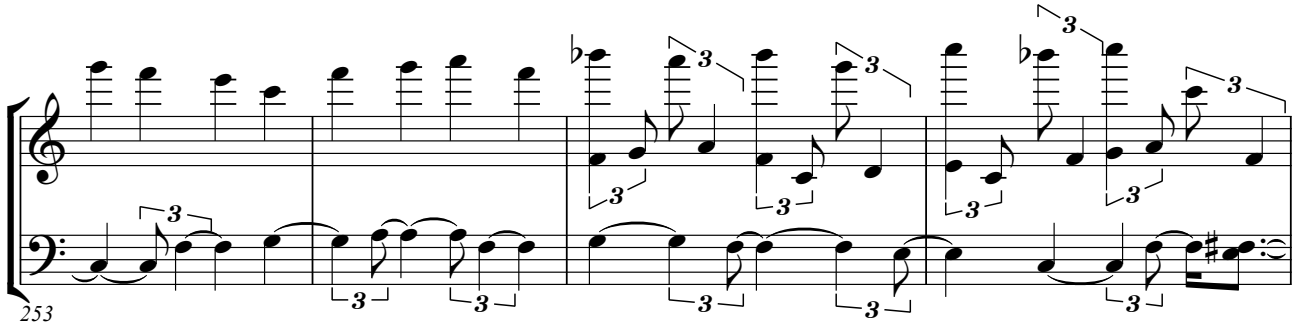


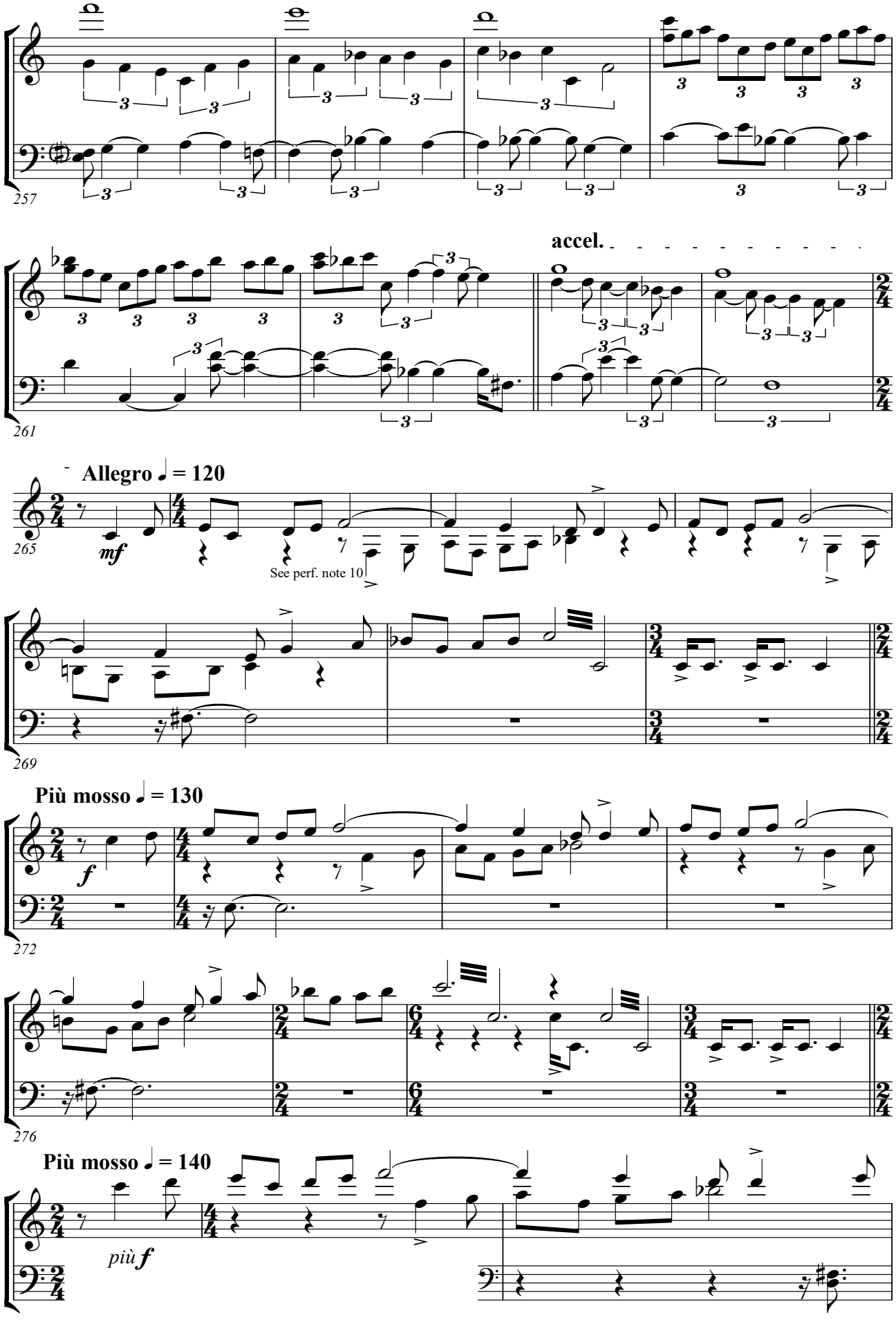


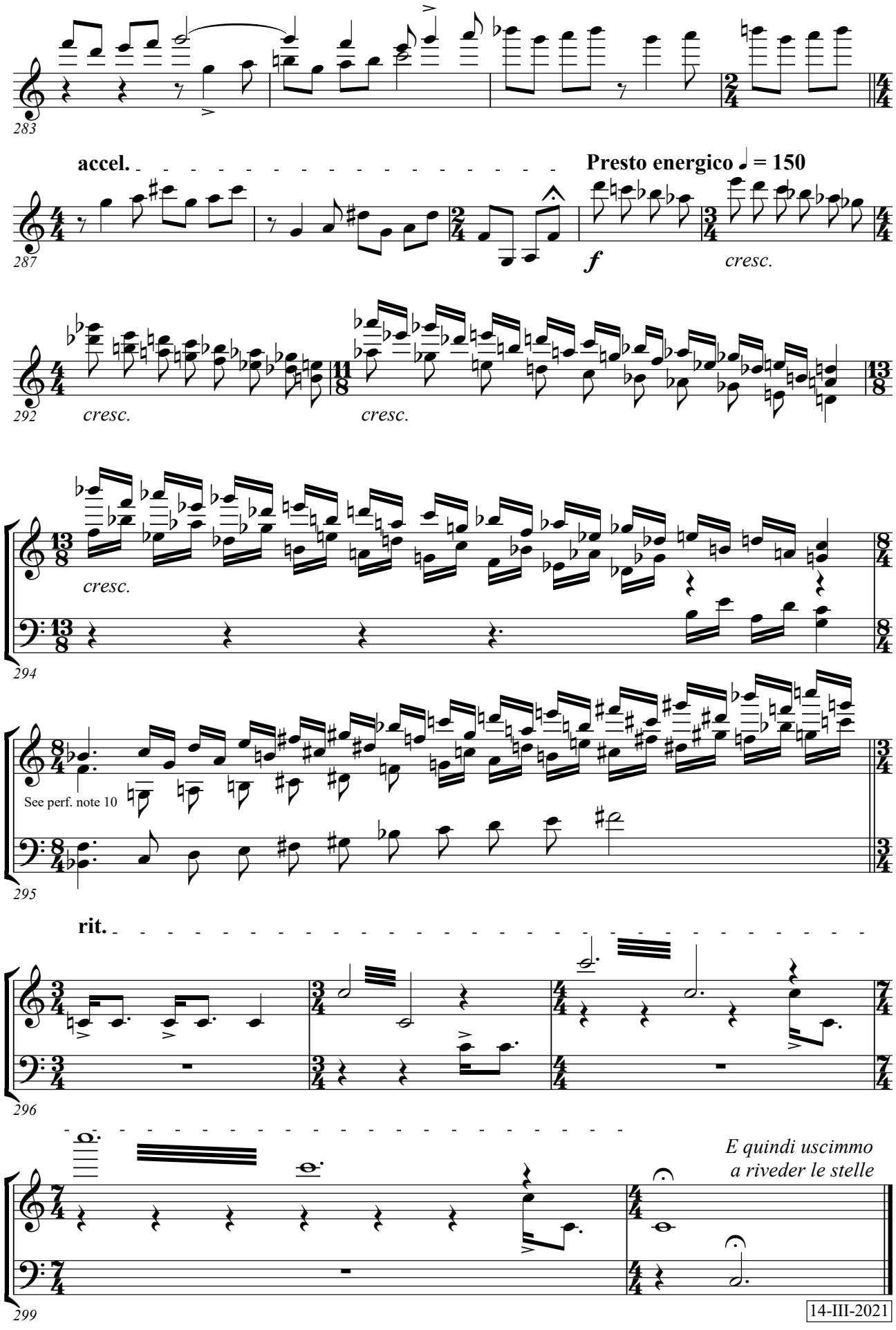


Calm ♩ = 60 See performance note 7






257
accel.
261
Allegro ♩ = 120
mf
See perf. note 10
265
269
Più mosso ♩ = 130
f
272
276
Più mosso ♩ = 140
più f


283
accel.
Presto energico ♩ = 150
287
f
cresc.
292
cresc.
cresc.
cresc.
294
See perf. note 10
295
rit.
296
E quindi uscimmo
a riveder le stelle
299
14-III-2021