## MODULUS-12 ANALYSIS

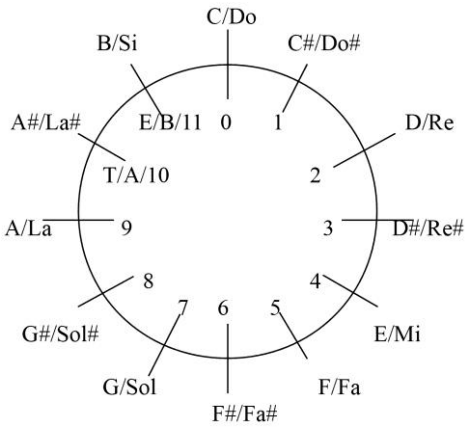
Case study: Mihai Popean, *Sanctus* from *Three Miniatures* (Sanctus I, II and III) (2011) (4:11) for pipe organ solo.

A complete example of twelve-tone or modulus-12 serial analysis can offer more clues of how to approach score analysis, especially in situations in which the series are subject to creative rendering and are, therefore, not always straightforwardly displaced within the musical texture.

Sanctus is the first work in a suite of three miniatures for solo pipe organ. The entire score is provided below. The student is invited to analyze it before moving to the next section in order to test the level of mastery of the knowledge acquired in the previous sections of this book.

First use the serial dial in order to extract the main series, then construct the matrix followed by score analysis in order to recognize all the series used. Further analysis should explore the connections and relationships between these series.

As it can be seen in the first two measures on the right hand, there are strong indications that the work is duodecafonic. As such, serial analysis is proper for this case. Using the serial dial we first determine the first series and calculate the serial matrix.



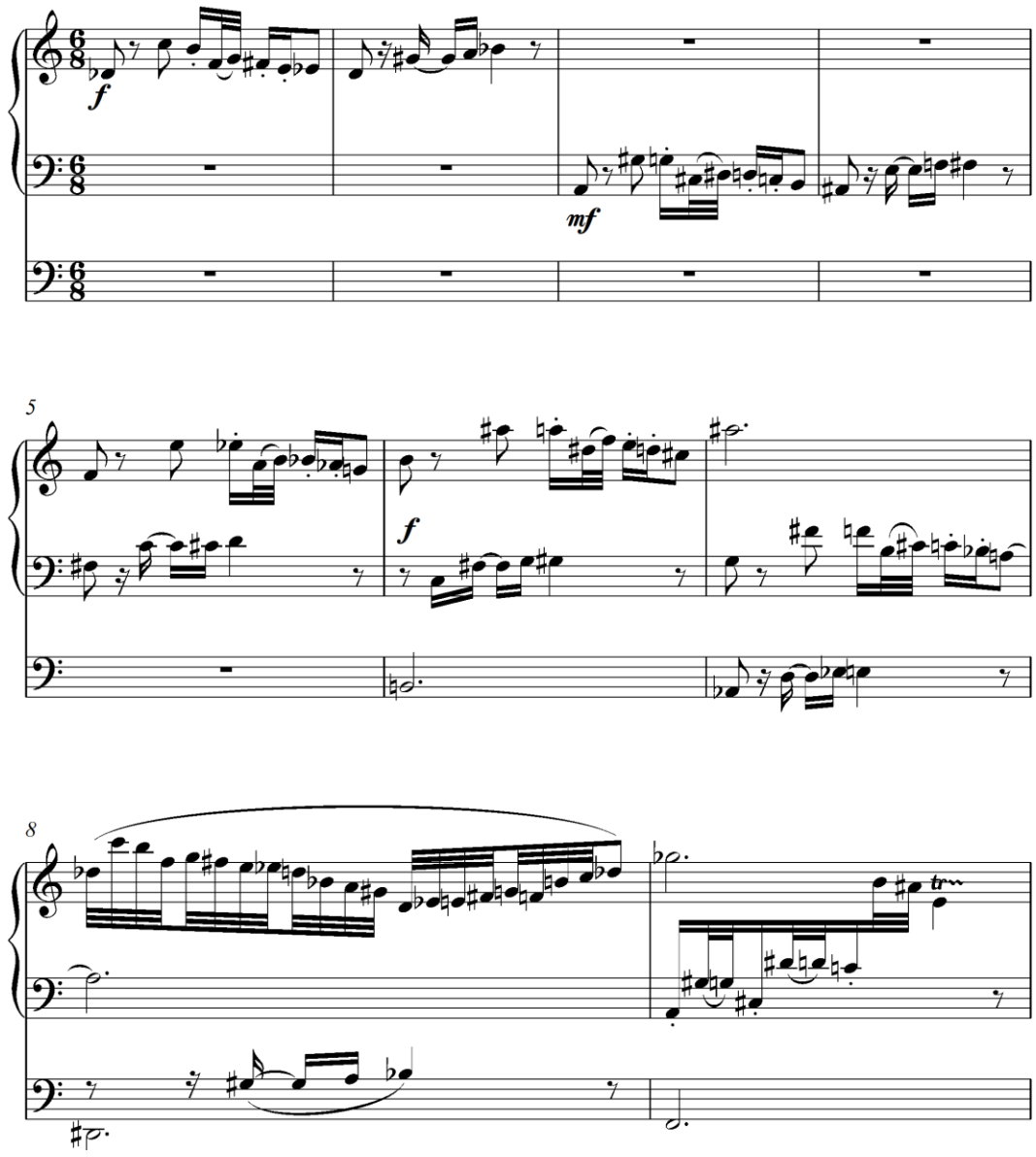
# THREE MINIATURES

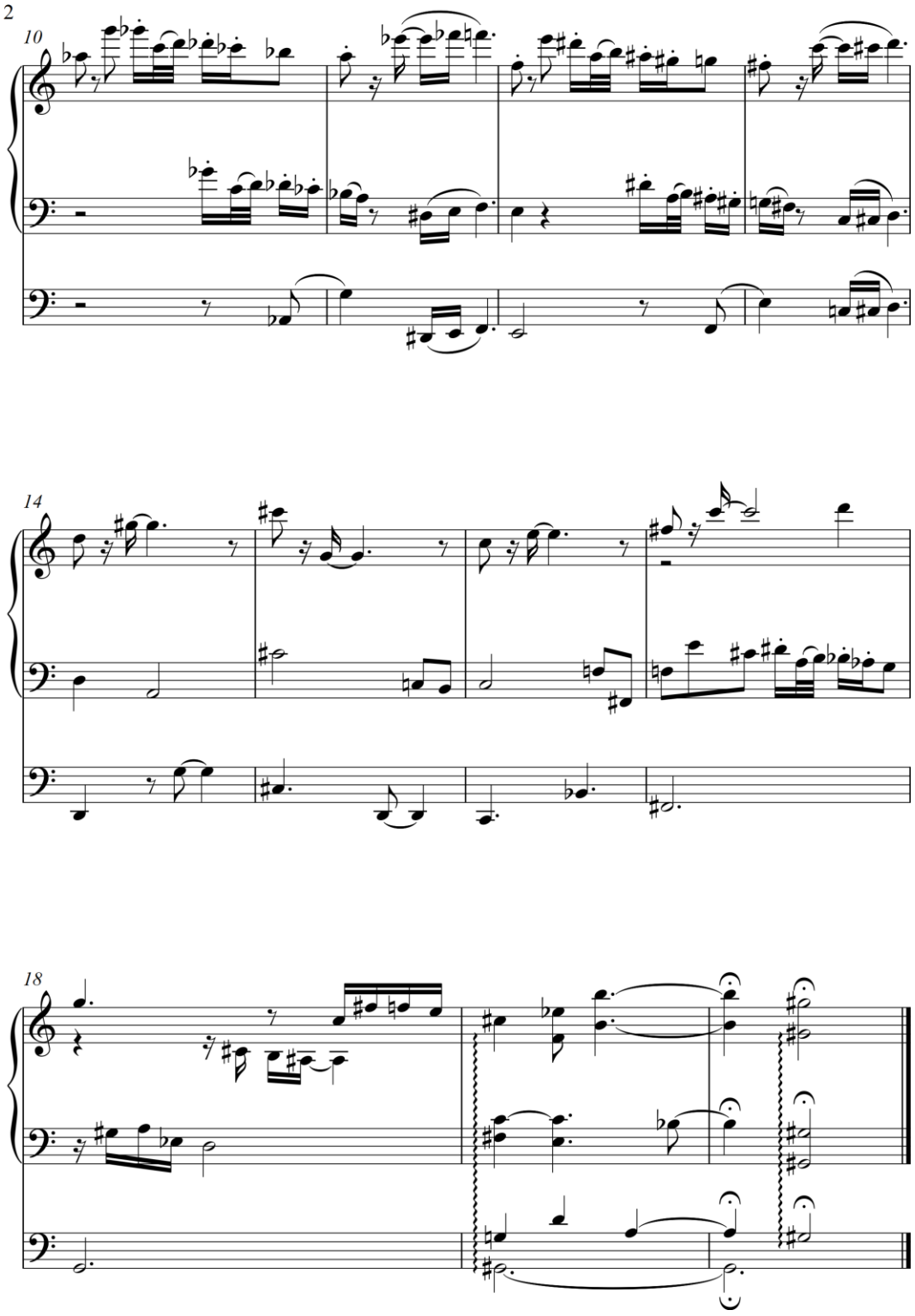
for Pipe Organ

## 1. SANCTUS

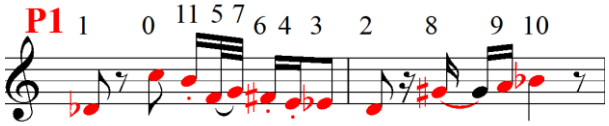
♪=110-120

Mihai Popean




10
14
18

The principal series starts on Db and therefore it is a P1 tone row.




Written with PCs, we use $P_1$ in order to find out $P_0$:

| **$P_1$** | 1 | 0 | B | 5 | 7 | 6 | 4 | 3 | 2 | 8 | 9 | A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$P_0$:** | 0 | B | A | 4 | 6 | 5 | 3 | 2 | 1 | 7 | 8 | 9 |

For the sake of simplicity, we start the twelve-tone matrix from $P_0$ this time, although we can start just as well from $P_1$. Regardless of how we start the matrix, the series should look the same, only their order changes from one case to another.

| | $I_0$ | $I_E$ | $I_T$ | $I_4$ | $I_6$ | $I_5$ | $I_3$ | $I_2$ | $I_1$ | $I_7$ | $I_8$ | $I_9$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_0$ | **0** | E | T | 4 | 6 | 5 | 3 | 2 | 1 | 7 | 8 | 9 | $R_0$ |
| $P_1$ | 1 | **0** | E | 5 | 7 | 6 | 4 | 3 | 2 | 8 | 9 | T | $R_1$ |
| $P_2$ | 2 | 1 | **0** | 6 | 8 | 7 | 5 | 4 | 3 | 9 | T | E | $R_2$ |
| $P_8$ | 8 | 7 | 6 | **0** | 2 | 1 | E | T | 9 | 3 | 4 | 5 | $R_8$ |
| $P_6$ | 6 | 5 | 4 | T | **0** | E | 9 | 8 | 7 | 1 | 2 | 3 | $R_6$ |
| $P_7$ | 7 | 6 | 5 | E | 1 | **0** | T | 9 | 8 | 2 | 3 | 4 | $R_7$ |
| $P_9$ | 9 | 8 | 7 | 1 | 3 | 2 | **0** | E | T | 4 | 5 | 6 | $R_9$ |
| $P_T$ | T | 9 | 8 | 2 | 4 | 3 | 1 | **0** | E | 5 | 6 | 7 | $R_T$ |
| $P_E$ | E | T | 9 | 3 | 5 | 4 | 2 | 1 | **0** | 6 | 7 | 8 | $R_E$ |
| $P_5$ | 5 | 4 | 3 | 9 | E | T | 8 | 7 | 6 | **0** | 1 | 2 | $R_5$ |
| $P_4$ | 4 | 3 | 2 | 8 | T | 9 | 7 | 6 | 5 | E | **0** | 1 | $R_4$ |
| $P_3$ | 3 | 2 | 1 | 7 | 9 | 8 | 6 | 5 | 4 | T | E | **0** | $R_3$ |
| | $RI_0$ | $RI_E$ | $RI_T$ | $RI_4$ | $RI_6$ | $RI_5$ | $RI_3$ | $RI_2$ | $RI_1$ | $RI_7$ | $RI_8$ | $RI_9$ | |

If the calculus is correct, the diagonal of the entire matrix should showcase 0 for this particular example, since the first tone row is $P_0$. If the first tone row were a different one, whatever the first number of the matrix was, that number must appear across the diagonal of the matrix.

The score analysis reveals that there are 17 series used in the score (P 1, 5, 7, 8, 9, 11, R 1, 11 and RI4), most of them quite easy to recognize, in different measures and configurations.

$P_1$ x2 → measures 1-2, 8
$P_5$ x4 → measures 5, 12-13 (twice), 17
$P_7$ x1 → measure 7
$P_8$ x2 → measures 10-11 (twice)
$P_9$ x1 → measures 3-4, 9, 14-16
$P_{11}$ x2 → measures 6, 7-20

$R_1$ x1 → measure 8
$RI_4$ x1 → measure 18
$R_{11}$ x1 → measure 19

Surface relationships between these series are as follows:

| | | | | |
|---|---|---|---|---|
| P1-P8=T7 | P5-P7=T2 | P7-P8=T1 | P8-P9=T1 | P11-R1=T10R |
| P1-P5=T4 | P5-P8=T3 | P7-P9=T2 | P8-P11=T3 | |
| P1-P7=T6 | P5-P9=T4 | P7=P11=T4 | P8R1=T7R | P11-RI4=T7RI |
| P1-P8=T7 | P5-P11=T6 | P7-R1=T6R | P8-RI4=T4RI | P11-R11=R |
| P1-P9=T8 | P5-R1=T4R | P7-RI4=T3RI | P8-R11=T3R | |
| P1-P11=T10 | P5RI4=T1RI | P7-R11=T4R | | |
| P1-R1=R | P5-R11=T6R | | P9-P11=T2 | R1-RI4=T3I |
| P1-RI4=T4RI | | | P9-R1=T8R | R1-R11=T10 |
| P1-R11=T10R | | | P9-RI4=T5RI | |
| | | | P9-R11=T2R | RI4-R11=T7I |

A segmentation in tetrachords of the main series with their normal and prime forms yield the following:

1. [0BA4] → [04AB] → [AB04] → (0126)
2. [BA46] → [46AB] → (0157)
3. [A465] → [456A] → (0126)
4. [4653] → [3456] → (0123)
5. [6532] → [2356] → (0134)
6. [5321] → [1235] → (0124)
7. [3217] → [1237] → (0126)
8. [2178] → [1278] → (0167)
9. [1789] → [7891] → (0126)
10. [7890] → (0125)
11. [890B] → [89B0] → (0134)
12. [90BA] → [9AB0] → (0123)

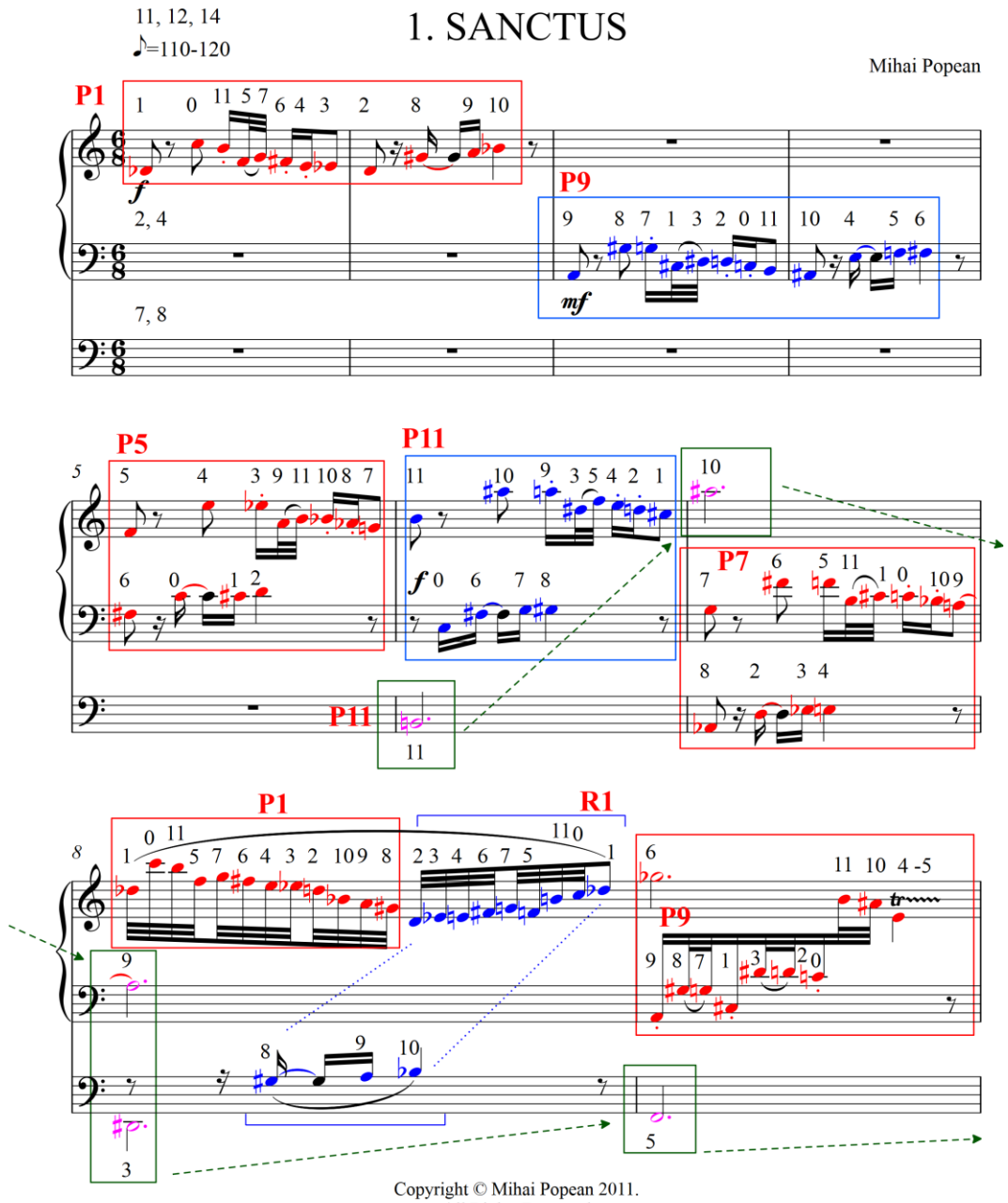
On these starting points, the student can develop further a thorough analysis. A proposed serial analysis of the whole score is presented below. Particular attention should be given to the series displaced in a non-conventional fashion, such as $P_{11}$ starting on the bass line in measure 6 as well as $P_9$ and $R_{11}$ in the last two systems of this work.

# THREE MINIATURES

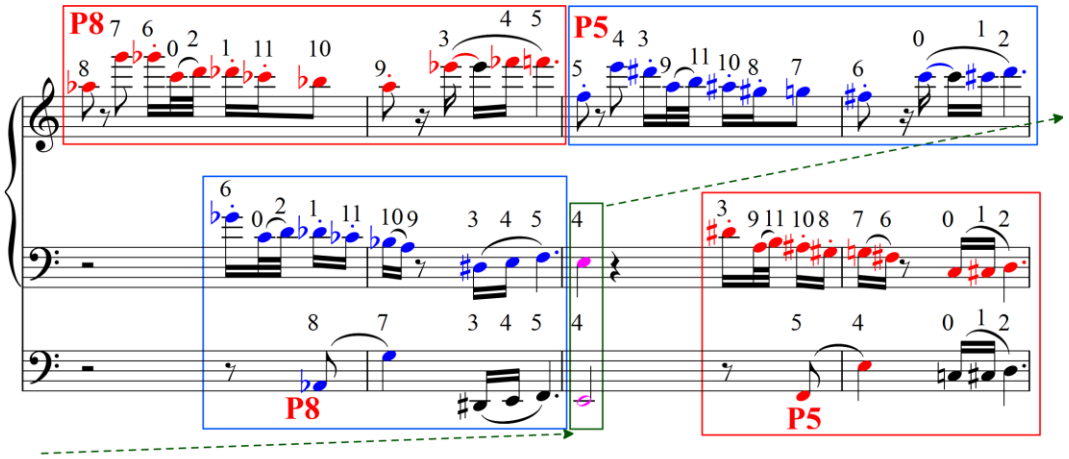
for Pipe Organ

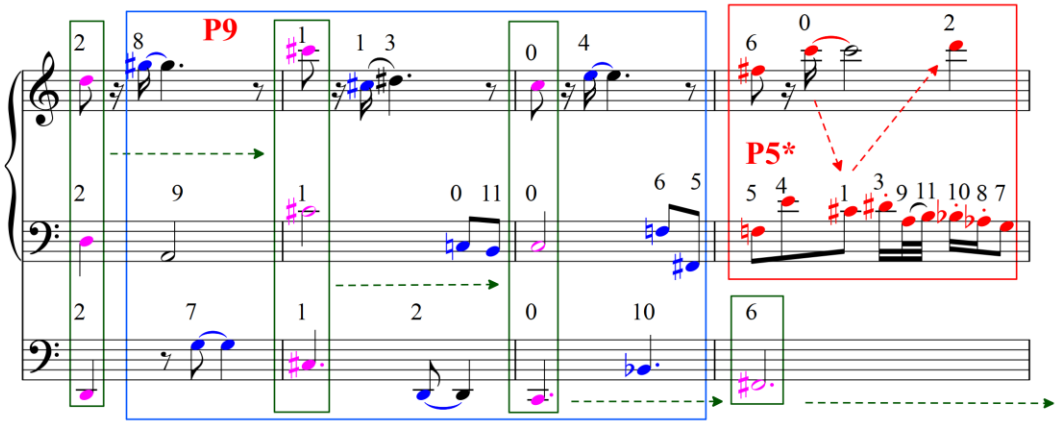
## 1. SANCTUS

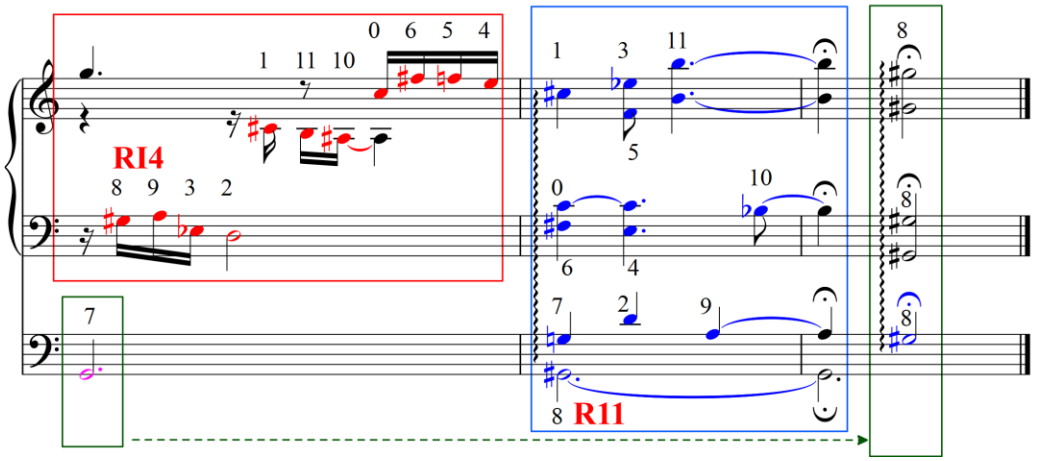
Mihai Popean




Copyright © Mihai Popean 2011.
All Rights Reserved


P8
P5
P8
P5


P9
P5*


RI4
R11