

Robert Rabinowitz

A Non-Linear Interpolation Via the Entanglement Matrices of the Einstein-Podolsky-Rosen Field

This quartet for C Flute, Alto Flute, Bass Flute, and Contrabass Flute takes its title from a concept exploring complex, interconnected systems where elements influence one another in profound, non-linear ways. Much like particles linked through quantum entanglement, the four distinct voices in this piece are treated not merely as independent melodic lines, but as components of a single, deeply intertwined musical entity.

The "Entanglement Matrices" are conceptually represented by the score itself – a blueprint mapping the intricate dependencies and potential states of the quartet. Within this framework, musical events initiated by one flute (a change in pitch, rhythm, dynamic, or timbre) do not simply cause a local reaction, but trigger complex, cascading transformations throughout the entire ensemble.

The "Interpolation" occurs as the music navigates between various sonic states and textures. However, this transition is decidedly "Non-Linear." Instead of smooth, predictable glides or sequential development, the piece unfolds through sudden shifts, unexpected juxtapositions, and interwoven layers where the relationships between the voices are paramount. The path from one musical moment to the next is not a straight line but a complex trajectory dictated by the internal "entanglement" of the four instruments.

Listeners are invited to experience a tapestry where the actions of one voice instantaneously reshape the context and character of the others, creating a dynamic, ever-evolving sound world that reflects the mysterious and interdependent nature suggested by the title. The work explores the rich timbral spectrum of the flute family as these "entangled" relationships push the music through a series of unpredictable and compelling transformations.

(Note: Performers are welcome to present this work without fee or royalty. If you perform it, I would be grateful if you would email me at rrabinowitz1@gmail.com with brief details of the performance (date, venue, and performers), a copy of the program when available, and an audio or video recording if one is easily obtainable. Recordings are appreciated but not required.)

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5/4 $\text{♩} = 100$ 4/4 5/4

Flute *mp* *f* *mp* *p*

Alto Flute *ff* *p* *ff* *f > p* *f > p* *p*

Bass Flute *ff* *p* *mf* *ff* *p* *f > p* *f* *p* *p*

Contrabass Flute *ff* *p* *ff* *f* *p*

5 5/4 4/4 fast to slow trill *ff* *p* *f* *mp* *p*

Fl. *ff* *f* *p* *f* *p* *pp* *p*

A. Fl. *ff* *f* *p* *f* *p* *pp* *p*

B. Fl. *ff* *f* *p* *f > p* *f* *p*

Cb. Fl. *ff* *f* *p* *f > p* *f* *p*

9 5/4 4/4 5/4 4/4 5/4

Fl. *f* *p* *f* *ff* *p*

A. Fl. *f* *p* *p* *ff* *p*

B. Fl. *f* *p* *p* *f*

Cb. Fl. *f* *p* *f* *p*

Einstein-Podolsky-Rosen Field

14 **5/4** **4/4**

Fl. *mp* *f* *mp* *f* *pp*

A. Fl. *mp* *f* *mp* *f* *f*

B. Fl. *f* *mf* *f* *mp* *f* *mp*

Cb. Fl. *p* *f* *mf* *f* *mp* *f* *p*

18 **4/4** **5/4** **5/4** **4/4**

Fl. *p* *f* *mf* *mp* *mf*

A. Fl. *f* *mp* *mf* *mp*

B. Fl. *p* *f* *p* *mf* *mp* *mf*

Cb. Fl. *f* *p* *mp* *mf* *mp*

22 *gliss.*

Fl. *p* *f* *p* *f* *mp*

A. Fl. *p* *f* *gliss.* *mf* *p*

B. Fl. *p* *mp* *f* *mf* *mp*

Cb. Fl. *mf* *p* *mf*

Einstein-Podolsky-Rosen Field

4

26

Fl. *f* *mp*

A. Fl. *mp* *f* *mp*

B. Fl. *mp* *f* *mp*

Cb. Fl. *mp* *f* *mp*

30

Fl. *f* *ff* *f* *ff* *mf*

A. Fl. *f* *ff* *f* *ff* *mp* *mf*

B. Fl. *f* *ff* *f* *ff* *mf*

Cb. Fl. *f* *ff* *f* *ff* *mp* *mf*

tr $\frac{3}{4}$ $\frac{2}{4}$ $\frac{4}{4}$

34

Fl. *mf* *p* *mp*

A. Fl. *p* *mp* *pp*

B. Fl. *p* *mp* *mf*

Cb. Fl. *p* *mf* *mp* *mf*

$\frac{5}{4}$

5 6

36 **5/4** **4/4**

Fl. *pp* *mp* *mf* *mp* *mf*

A. Fl. *p* *mf* *mp* *mf*

B. Fl. *pp* *mp* *mf*

Cb. Fl. *p* *pp* *p* *mp* *mf*

40 **2/4** **4/4** **5/4** **4/4**

Fl. *f* *p*

A. Fl. *f* *p*

B. Fl. *f* *p*

Cb. Fl. *f* *p* *mf* *f* *p*

44 **4/4** **5/4**

Fl. *mp* *f* *mp* *mf* *p*

A. Fl. *mp* *f* *mp* *mf* *pp*

B. Fl. *mp* *f* *mf* *mp* *mf* *p*

Cb. Fl. *mp* *f* *mf* *mp* *mf* *p*

Einstein-Podolsky-Rosen Field

6

48

Fl. *mf* *p* *pp* *mp*

A. Fl. *p* *mf* *p* *mf* *p* *mp*

B. Fl. *mf* *p* *f* *mf* *pp* *mp*

Cb. Fl. *mf* *p* *mf* *f* *mf* *mp*

3/4 4/4

7 6 5

52

Fl. *ff* *mf* *p* *f*

A. Fl. *ff* *p* *mf* *f*

B. Fl. *ff* *mf* *mp* *mf* *f*

Cb. Fl. *ff* *mf* *mp* *f* *f*

7/4 4/4

55

Fl. *mp* *mf* *mp* *p* *pp*

A. Fl. *mp* *f* *mf* *mp* *p* *pp*

B. Fl. *mp* *f* *mf* *mp* *p* *pp*

Cb. Fl. *mp* *f* *mf* *mp* *p* *pp*

4/4 3/4 4/4 4/4

Einstein-Podolsky-Rosen Field

58

4/4 3/4 4/4 5/4

Fl. *p* *mf* *p* *f* *p*

A. Fl. *p* *mf* *p* *f* *p*

B. Fl. *p* *mf* *p* *f* *p*

Cb. Fl. *p* *mf* *p* *f* *p*

61

5/4 4/4

Fl. *f* *p* *f* *p*

A. Fl. *f* *p* *f* *p*

B. Fl. *f* *p* *f* *p*

Cb. Fl. *f* *p* *f* *p*

63

4/4

Fl. *ff* *fff* *pp*

A. Fl. *ff* *fff* *pp*

B. Fl. *ff* *fff* *pp*

Cb. Fl. *ff* *fff* *pp*

slap tongue

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♩ = 100

Measures 1-35 of the musical score for Flute. The score is written in treble clef with a key signature of one flat (B-flat). It features various musical notations including notes, rests, slurs, and dynamic markings. Fingerings (1-5) and breath marks (trills) are indicated. The tempo is marked as quarter note = 100.

Measures 1-5: *ppp* *f* *ppp* *p* *ff* *> p*

Measure 6: *< f* *pp p* *f*

Measures 10-13: *p* *f* *ff* *p*

Measures 14-17: *mp* *< f* *mp* *< f* *pp*

Measures 18-20: *p* *f* *mf* *3* *3* *mp*

Measures 21-25: *mf* *p* *f* *p* *< f* *> mp*

Measures 26-29: *f* *mp*

Measures 30-34: *f* *ff* *f* *ff* *mf* *< mf* *p*

Measures 35-38: *mp* *> pp* *mp* *< mf* *> mp* *mf*

Flute

Einstein-Podolsky-Rosen Field

2

40 *f*

44 *mp* *f* *mp* *mf* *p*

48 *mf* *p* *pp* *mp*

52 *ff* *mf* *p* *f* *mp*

56 *mf* *mp* *p* *pp*

58 *p* *mf* *p*

60 *f* *p* *f* *p*

62 *f* *p*

64 *ff* *fff* *pp*

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$\text{♩} = 100$

slap tongue

Measures 1-33 of the musical score for Alto Flute. The score is in 4/4 time with a tempo of 100. It features various dynamics (ff, p, f, mp, mf, pp), articulations (accents, slurs, gliss.), and fingerings (5, 4, 3, 2). A 'slap tongue' instruction is present in measure 1. The key signature has one flat (Bb).

2

[illegible]

[illegible]

Bass Flute

Einstein-Podolsky-Rosen Field

2

36 *pp* *mp* *mf*

40 *f* *p*

44 *mp* *f* *mf* *mp*

46 *mf* *p*

48 *mf* *p* *f* *mf*

51 *pp* *mp* *6* *ff* *mf*

54 *mp* *mf* *f* *mp*

56 *f* *mf* *mp* *p* *pp*

58 *p* *mf* *p* *f* *p*

61 *f* *p* *f* *p*

63 *gliss.* *tr~* *gliss.* *slap tongue* *ff* *fff* *pp*

[illegible]

Contrabass Flute

Einstein-Podolsky-Rosen Field

2

36 *p* *pp* *p* *mp* *mf*

40 *f* *p* *mf*

43 *f* *p* *mp*

45 *f* *mf* *mp* *mf* *p*

48 *mf* *p* *mf* *f* *mf* *mp* *5*

52 *ff* *mf* *mp* *f* *f*

55 *mp* *f* *mf* *mp* *p* *pp*

58 *p* *mf* *p* *f* *p*

61 *f* *p* *f* *p*

63 *gliss.* *gliss.* *gliss.* *f* *pp* *slap tongue* *fff* *pp*