

BROKEN SYMMETRIES

Six Baroque Dances for String Quartet

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The inspiration for *Broken Symmetries* comes from the courtly dances of the late Renaissance and Baroque eras, refracted through the pitch organizational techniques of the early twentieth century and the cosmology of the late twentieth century.

Broken Symmetries is dedicated to Stephen Hawking.

PERFORMANCE NOTE

Broken Symmetries should be played with expressiveness but with the rhythmic regularity of the dance. The six movements should be played without a break.

1. Bourrée for the Beginning of Time

1

Allegro moderato $\text{♩} = 116$

Musical score for measures 1-6. The score consists of four staves: Violin 1, Violin 2, Viola, and Violoncello. The key signature is common time (no sharps or flats). Measure 1 starts with a dynamic *f*. Measure 2 starts with a dynamic *f*. Measure 3 starts with a dynamic *pizz.* Measure 4 starts with a dynamic *f*. Measure 5 starts with a dynamic *pizz.* Measure 6 starts with a dynamic *f*.

Musical score for measures 7-12. The score consists of four staves: Violin 1, Violin 2, Viola, and Violoncello. Measure 7 starts with a dynamic *mp* followed by *cresc.* Measure 8 starts with a dynamic *mp* followed by *cresc.* Measure 9 starts with a dynamic *mp* followed by *cresc.* Measure 10 starts with a dynamic *mp* followed by *cresc.*

Musical score for measures 13-18. The score consists of four staves: Violin 1, Violin 2, Viola, and Violoncello. Measure 13 starts with a dynamic *f*. Measure 14 starts with a dynamic *ff*. Measure 15 starts with a dynamic *ff*. Measure 16 starts with a dynamic *dim.*. Measure 17 starts with a dynamic *dim.*. Measure 18 starts with a dynamic *dim.*

[20] *pizz.*

f
pizz.

f
arco

f
arco

f

[26]

mp cresc.

mp cresc.

mp cresc.

mp cresc.

ff

ff

ff

ff

[32]

dim.

mp

dim.

mp

dim.

mp

dim.

mp

Musical score page 3, measures 38-39. The score consists of four staves. The top staff (treble clef) has dynamics ff and arco. The second staff (treble clef) has dynamics ff and arco. The third staff (bass clef) has dynamics pizz. The bottom staff (bass clef) has dynamics ff and pizz. Measure 38 starts with a forte dynamic ff and arco. Measure 39 begins with a dynamic ff and arco.

44

p

cresc. poco a poco

p *cresc. poco a poco*

p *cresc. poco a poco*

Musical score for orchestra and piano, page 15, measures 50-54. The score consists of four staves: Violin 1 (top), Violin 2, Cello, and Bass. The key signature changes between B-flat major (measures 50-51), A major (measures 52-53), and G major (measure 54). Measure 50 starts with a forte dynamic (ff) in B-flat major. Measure 51 shows eighth-note patterns with grace notes. Measures 52-53 transition to A major with eighth-note patterns. Measure 54 concludes in G major with eighth-note patterns. Dynamics include ff, dim., rit., mp, arco, and ff. Measure numbers 50, 51, 52, 53, and 54 are indicated above the staves.

2. Sarabande within a Cloud Chamber

Andante con moto $\text{d} = 96$

Violin 1: Treble clef, 3/2 time signature. Notes: - (Measure 1), - (Measure 2), - (Measure 3), - (Measure 4), - (Measure 5), - (Measure 6), - (Measure 7).

Violin 2: Treble clef, 3/2 time signature. Notes: - (Measure 1), - (Measure 2), - (Measure 3), - (Measure 4), - (Measure 5), - (Measure 6), - (Measure 7).

Viola: Bass clef, 3/2 time signature. Notes: - (Measure 1), - (Measure 2), - (Measure 3), - (Measure 4), - (Measure 5), - (Measure 6), *pizz.* *arco* (Measure 7).

Violoncello: Bass clef, 3/2 time signature. Notes: *fp* (Measure 1), *ff* (Measure 2), *pp* (Measure 3), *mf* (Measure 4), *tr* (Measure 5), *fp* (Measure 6), *tr* (Measure 7). Dynamics: *ff*, *pp*, *pizz.*

Measure 7: Treble clef, 3/2 time signature. Notes: - (Measure 1), - (Measure 2), - (Measure 3), - (Measure 4), - (Measure 5), - (Measure 6), *tr* (Measure 7). Dynamics: *mf*, *pp*, *pizz.*

Measure 13: Treble clef, 3/2 time signature. Notes: *fp* (Measure 1), *ff* *pp* *pizz.* (Measure 2), *mf* *arco* (Measure 3), *pizz.* *arco* (Measure 4), *tr* (Measure 5), *fp* (Measure 6), *tr* (Measure 7). Dynamics: *f sonore*, *mf*, *mp*.

19

tr

pizz. arco

ff pp

mf

mp

tr

tr

ff

pp

mf

25

legato con calore

ff

mf

ff

ff legato con calore

ff legato con calore

31

sul ponticello

ff legato con calore

mf

ff legato con calore

arco

mf

37

normale

p

ff *più legato*

p

ff *più legato*

43

String section (Violin I & II) play eighth-note patterns. The top violin uses pizzicato (labeled *pizz.*) and arco (labeled *arco*). The bottom violin plays eighth-note pairs. The cello and double bass provide harmonic support. The basso continuo part consists of two staves: one for the bassoon and one for the harpsichord. The bassoon part is labeled *mp* and *p*, with slurs and grace notes. The harpsichord part is also labeled *mp* and *p*.

55

pizz. *arco*

tr b

61

f

pizz. *arco*

pp

p

tr b

pp

f

p

f sonore

pizz. arco

67

pizz.

f sonore

pizz.

f sonore

pizz.

f sonore

pizz.

f sonore

73 *arco* *pizz.* *arco* *sul ponticello* *normale*

fp *ff* *pp* *p* *fff*

arco *pizz.* *arco* *sul ponticello* *normale*

fp *ff* *pp* *p* *fff*

arco *pizz.* *arco* *sul ponticello* *normale*

fp *ff* *pp* *p* *fff*

arco *pizz.* *arco* *sul ponticello* *normale*

fp *ff* *pp* *p* *fff*

Musical score for string quartet, page 77, measures 1-4. The score consists of four staves: Violin 1 (top), Violin 2, Cello, and Bass. Measure 1: Violin 1 has a fermata over the first note, followed by a short note with *pizz.* and *mp*. Violin 2 has a short note with *pizz.* and *mp*. Cello has a short note with *pizz.* and *mp*. Bass has a short note with *pizz.* and *mp*. Measure 2: Violin 1 has a short note with *pizz.* and *mp*. Violin 2 has a short note with *p*. Cello has a short note with *p*. Bass has a short note with *p*. Measure 3: Violin 1 has a short note with *non vibrato*. Violin 2 has a short note with *p*. Cello has a short note with *p*. Bass has a short note with *p*. Measure 4: Violin 1 has a short note with *arco*. Violin 2 has a short note with *p*. Cello has a short note with *p*. Bass has a short note with *p*.

Musical score for orchestra, page 81, measures 1-5. The score consists of four staves: Violin (G clef), Cello (C clef), Double Bass (Bass clef), and Bassoon (F clef). The key signature is one sharp. Measure 1: Violin plays a sustained note with a grace note above it. Measure 2: Violin plays a sustained note with a grace note below it. Measure 3: Cello and Double Bass play sustained notes. Measure 4: Bassoon plays a sustained note with a grace note below it. Measure 5: Bassoon plays a sustained note with a grace note above it. Dynamics: 'arco' (Measure 1), 'non vibrato' (Measures 2, 4, 5), 'p' (Measures 3, 5).

3. Courante of the Quarks

Presto $\text{d} = 76$

This musical score section covers measures 1 through 5. It includes four staves: Violin 1 (G clef), Violin 2 (G clef), Viola (C clef), and Violoncello (C clef). The key signature changes from no sharps or flats to one sharp (F#) in measure 5. Measure 1 has rests for all instruments. Measures 2-4 feature eighth-note patterns with dynamic markings: pp , $<mp$, $pp < mp$, and p . Measure 5 shows sustained notes with dynamics pp .

6

This section covers measures 6 through 11. Measure 6 begins with a rest followed by eighth-note patterns. Measures 7-10 show eighth-note patterns with dynamics: $<mp$, $pp < mp$, and pp . Measure 11 concludes with sustained notes.

12

This section covers measures 12 through 17. Measure 12 features eighth-note patterns with a dynamic p . Measures 13-16 show sustained notes with dynamics p . Measure 17 concludes with sustained notes.

17

mp

mf

mp

mf

mp

mf

mp

mp

22

f

mf

f

mp

mp

mp

27

mp

mp

mp

[32]

mp

mf

p

mf

[37]

f

[42]

f

47

51

54

4. Pavane for a Proton's Decay

Andante calmato ♩ = 84

Violin 1

Violin 2

Viola

Violoncello

7

plaintive

sonore

sonore

mp

13

mf

p

mp

mf

18

measures 18-23: Dynamics include *mf*, *f*, *ff*, and *p*. Measure 23 ends with sustained notes.

24

measures 24-29: Dynamics include *f*, *dim.*, *p*, and *mp*. Measure 29 ends with sustained notes.

28

measures 28-33: Dynamics include *mf*, *mp*, and *p*. Measure 33 ends with sustained notes.

[33]

[38]

[42]

5. Minuet of the Massless Particles

Allegro $\text{d} = 76$

Violin 1: Staff 1, Treble clef, 3/4 time, key signature of one flat. Dynamics: ***ff***. Measures 1-4.

Violin 2: Staff 2, Treble clef, 3/4 time, key signature of one flat. Dynamics: ***ff***. Measures 1-4.

Viola: Staff 3, Bass clef, 3/4 time, key signature of one flat. Measure 1: rest. Measures 2-4: **vigoroso**, ***mp***, ***vigoroso***.

Violoncello: Staff 4, Bass clef, 3/4 time, key signature of one flat. Measure 1: rest. Measures 2-4: ***ff***, ***mp***, ***ff***.

System 2 (Measure 7): Violin 1: rest. Violin 2: rest. Viola: ***piu f***. Violoncello: ***ff***.

System 3 (Measure 13): Violin 1: rest. Violin 2: rest. Viola: ***pizz.*** Violoncello: ***p***.

System 4 (Measure 14): Violin 1: rest. Violin 2: rest. Viola: ***pizz.*** Violoncello: ***p***.

19

mf

pizz.

mp

mp

mp *f*

pp *mp*

25

arco

mf *ff*

ff

ff

ff

31

ff *mp*

ff *mp*

f

f

f

f

> >

37

mp cresc.

43

f

cresc.

cresc.

cresc.

49

ff

ff

ff

ff

55

ff
mp
f

62

p
mp
p
f

69

p
p
ff dim.
p

6. Gigue of the Grand Unified Theory

Allegro vivace $\text{♩} = 116$

Violin 1

Violin 2

Viola

Violoncello

7

13

arco

mp

arco

mp

arco

pizz.

ff

pizz.

ff

f

arco

[19]

pizz.

ff

pizz.

ff

[25]

ff

ff

mf

ff

mf

[31]

ff

ff

mf

arco

pp *#* *cresc.*

37

arco

mp cresc.

p cresc.

arco

41

accelerando

pizz.

ff

pizz.

ff

46

pizz.

ff

pizz.

ff

arco

arco

arco

arco