

Exotic Particles and the Confinement of Quarks

A Subatomic Fantasy for Wind Ensemble

for Ray E. Cramer and the Indiana University Wind Ensemble

Don Freund
2004

Duration: ca. 8 minutes Score is transposed.

Instrumentation:

Piccolo(s)
Flutes 1 & 2
Oboes 1 & 2
E♭ Clarinet(s)
B♭ Clarinets 1, 2, & 3
B♭ Bass Clarinet(s)
B♭ Contrabass Clarinet (parts also available for E♭ Contra-alto Clarinet and String Bass)
B♭ Soprano Saxophone
E♭ Alto Saxophones 1 & 2
B♭ Tenor Saxophone(s)
E♭ Baritone Saxophone(s)
Bassoons 1 & 2

B♭ Trumpets 1-4
Horns 1-4 (2nd "high", 3rd "low")
Trombones 1-4 (4th = Bass Trombone)
Euphoniums 1 & 2
Tubas 1 & 2

Piano/Celesta

Percussion 1-6:

Percussion 1
Glockenspiel (sounds 2 octaves higher), Xylophone (sounds 1 octave higher) [*may share with Percussion 2*],
Chimes [*may share with Percussion 4*], Large Tamtam

Percussion 2

Vibraphone, Xylophone (sounds 1 octave higher) [*may share with Percussion 1*],
3 Tuned Gongs (G³, B³, F^{#4}),
Small Suspended Cymbal, Brake Drum

Percussion 3

Marimba, Small Tamtam, Medium Hand Drum, Wood Block

Percussion 4

Crotales (2 octave set), Chimes [*may share with Percussion 1*],
Large Almglocke (F^{#4}), High Brake Drum, Slide Whistle,
2 Suspended Cymbals, Triangle

Percussion 5

3 Tomtoms, Slit Drum (2 pitches), Low Snare Drum, Bass Drum,
Small Suspended Cymbal, 2 Wood Blocks,
Small Tambourine, Large Tambourine, Large Cowbell,
Lion's Roar (ossia Bass Drum w/Superball mallet)

Percussion 6

3 Timpani G², B³, F([#])³,
Small Tamtam, High Bongo, Splash Cymbal (wood stick),
Ratchet, Claves, Police Whistle

Don Freund:

Exotic Particles and the Confinement of Quarks

A Subatomic Fantasy for Wind Ensemble

for Ray E. Cramer and the Indiana University Wind Ensemble

after the eponymous Distinguished Faculty Research Lecture by Alex Dzierba

Program Notes:

In April of 2004, Indiana University Physics Professor Alex Dzierba presented his Distinguished Faculty Research Lecture: *Exotic Particles and the Confinement of Quarks*. Within the proton's hot, bubbling cauldron of activity, quarks and glue move at nearly light speed and quarks and anti-quarks pop continuously in and out of existence. When pried even one proton's width apart (less than one trillionth the size of an atom), quarks experience ten tons of force pulling them together. Quarks are so small that we have not been able to measure their size; they take up less than one billionth of the space inside the proton. Particle accelerators can blast quarks out of a nucleus, but within much less than a billionth of a nanosecond "free" quarks join with newly created ones and brand new particles are formed. *

Now, thanks to the marvels of modern compositional technology, we are able to expand the world of the quark billions of billions of billions of times to produce an aural replica encompassing eight minutes of time and the space and sound range of a large wind ensemble. It is thus possible to hear evanescent particles come into being and disappear, massless neutrinos passing through, and even the moaning low brass of the confined quarks. We are amazed to discover that at this magnification one can even hear the passing of time in bits of a Morse code mantra that seems to take on a syncopated groove. At one point the violent batterings of colliding particles threaten to break this world apart but the superpowerful force of gluon surges to bring things back together.

The depictions and accounts presented in this work are solely those of the composer, and in no way is the IU Department of Physics responsible for their accuracy. Furthermore the Department of Bands cannot be held liable for any disfiguring of the listener's psycho-acoustic physiology created by the use of the lion's roar or androgynous C triads (with a quarter-tone third.)

Exotic Particles and the Confinement of Quarks was written in celebration of the tenure of Ray E. Cramer as IU's Director of Bands as he prepares for his retirement, which we suspect will be superactive, exotic, and wonderfully quarky.

*Paraphrased from a flyer provided by the Jefferson Lab (the Thomas Jefferson National Accelerator Facility.) Bona fide information about Alex Dzierba and his research can be found at <http://dustbunny.physics.indiana.edu/~dzierba/>

(Transposed Score)

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8 **11**

Piccolo

Flutes 1&2

Oboes 1&2

E♭ Clarinet

B♭ Clarinets 1
2
3

B♭ Bass Clarinets

B♭ Contrabass Clarinet
(parts also available for
E♭ Contrabass Clarinet
and String Bass)

B♭ Soprano Saxophone

E♭ Alto Saxophones 1&2

B♭ Tenor Saxophone

E♭ Baritone Saxophone

Bassoons 1&2

144 **76**

8 **11**

1 & 2 Trumpets in B♭

3 & 4 (2nd horn "high")
1 & 2 Horns in F
(3rd horn "low")

1 & 2 Trombones

3 & 4 (Bass)

Euphoniums

Tubas

Piano (doubles celesta)

Glockenspiel

Percussion 1

Vibraphone

Percussion 2

Marimba

Almglocke soft rubber mallets

Percussion 4

Small Tambourine hit

Percussion 5

shake

Percussion 6

Splash Cymbal

wood stick

144 **76**

12

14

18

22

Picc.

F1l&2

Ob1&2

E(Cl)

Bb Cl 1

Bb Cl 2

Bb Cl 3

Bs Cl

Bb Cb Cl

S Sx

ASx1&2

TSx

BSx

Bn1&2

14

18

22

Bb Tpts

3&4

Hns (F)

3&4

Tn

3&4

Euph

Tb

Piano

Pré 1

Vibraphone

Small Susp. Cymbal

Marimba

High Brake Drum

Pré 3

hard plastic mallets

Low Snare Drum

Pré 4

Ratchet

Pré 5

wood sticks

Pré 6

Picc. *flutter (top note only)* *f p*

F1&2 *p*

Ob1&2 *1. solo* *tutti* *mf*

ECl *ff* *solo* *tutti* *mp f pp fpp f pp*

Bb Cl *ff* *mp f pp fpp f pp*

Bs Cl

B-CbCl

S Sx *fp* *fp* *fp* *fp*

ASx1&2 *1. solo* *fp* *fp*

TSX *fp* *fp* *fp*

BSX

Bn1&2 *tutti* *mf* *p*

straight muted

1&2 *1. solo* *p*

Bb Tpts *2. solo* *p* *cup muted*

3&4 *3. solo* *harmonia muted stem extended* *f* *play loud enough to continue the line from trombone 3*

Hns (F) *p* *mf*

Tra *3. solo straight muted* *p* *mf*

3&4 *p* *mf*

Euph *1. solo* *mf* *p* *mf* *ossia: octave lower*

Tb

Piano *mf* *f* *f* *f*

Pré 1 *f*

Pré 2

Pré 3 *mf ff* *p* *mf* *p* *mf* *p* *mf* *p*

Pré 4 *snares off*

Pré 5 *pp* *mf*

Pré 6

40

44

49

Picc.

F11&2

Ob1&2

mf — p

ff

tutti ff

E♭Cl

ff

B♭ Cl 2

ff

B♭ Cl 3

ff

B♭ Cl

B♭ Cb Cl

S Sx

ff

tutti ff

A Sx1&2

ff

T Sx

ff

B Sx

Bn1&2

mf — p

mf

40

44

49

1&2 Bb Tpts

mf p

tutti open

3&4 f

(foreground) half-stop to B 1/4-tone flat

1&2 Hns (F)

open

ff

1&2 Tn

open ff

ff

3&4

ff

tutti

Euph

Tb

Piano

Glockenspiel

Vibraphone

Large Tamtam

Vibraphone

Marimba

Marimba

Triangle

Small Tambourine shake

Timpani

p →

scrape rim with triangle beater

Pré 1

ff

Pré 2

p ff

Pré 3

mf

ff

Pré 4

Pré 5

ff

Pré 6

ff

ff

f = ff = p = pp

Picc.

F1l&2 *p* *f*

Ob1&2

ECl

Bb Cl 1 *p* *f*

Bb Cl 2 *p* *f*

Bb Cl 3 *p* *f*

Bs Cl

B-Cb Cl

S Sx

ASx1&2 *f* *p*

TSX *f* *p*

BSX

Bn1&2

55 *cup muted*

Bb Tpts *f* *p* *harmon muted stem extended*

3&4 *f* *p* *play loud enough to match cup muted trumpets in m. 55*

Hns (F) *ff* *muted*

1&2 Tr *ff* *cup muted*

3&4 *ff* *harmon muted stem extended*

Euph

Tb

Piano *p*

Prc 1 *scrape rim* *scrape from center to rim* *p*

Prc 2 *p* *p* *p* *p*

Prc 3 *p* *p* *p* *p*

Prc 4 *p*

Prc 5 *Large Cowbell* *hard rubber mallets* *ff*

Prc 6 *High Bongo (hands)* *mp* *pp* *mp* *pp*

10

63

67

72

Picc.

E 1/4-tone flat

Fl1&2

Ob1&2

EcCl

Bb Cl 1

Bb Cl 2

Bb Cl 3

Bs Cl

BbCbCl

S Sx

ASx1&2

TsSx

BsSx

Bn1&2

flutter 3

tutti

f = p

mf = p

p = f

p = f

p = f

p = f

E 1/4-tone flat

67

72

1&2
Bb Tpts

3&4

1&2
Hns (F)

3&4

1&2
Tn

3&4

Eup

Tb

Piano (measures 1-10): The piano part consists of two staves. The top staff features a continuous pattern of sixteenth-note pairs in 3/4 time, with dynamic markings of *mp*, *p*, and *f*. The bottom staff has eighth-note patterns with similar dynamics.

(Chimes) (measures 1-10): A single melodic line for chimes, starting with eighth-note pairs and transitioning to quarter notes.

Pre 1 (measures 1-10): An eighth-note melodic line.

Pre 2 (measures 1-10): An eighth-note melodic line with dynamic markings of *p*, *mp*, *f*, and *mf*.

Pre 3 (measures 1-10): A mostly silent part with a few eighth-note pairs at the end.

Pre 4 (measures 1-10): A mostly silent part.

Pre 5 (measures 1-10): A mostly silent part.

Pre 6 (measures 1-10): An eighth-note melodic line with dynamic *mp*.

Large Suspended Cymbal (measures 1-10): Indicated by a box above the Pre 4 and Pre 5 staves, with a note pointing to the cymbal symbol.

Small Susp. Cymbal (measures 1-10): Indicated by a box above the Pre 4 and Pre 5 staves, with a note pointing to the cymbal symbol.

Small Tambourine (measures 1-10): Indicated by a box above the Pre 6 staff, with a note pointing to the tambourine symbol.

hard yarn mallet (measures 1-10): Indicated below the Pre 6 staff, with a note pointing to the mallet symbol.

75

81

85

Pic.

F1l&2

Ob1&2

ECl

1

Bb Cl 2

3

Bs Cl

B-Cb Cl

S Sx

ASx1&2

Tsx

mf solo

BSx

mf solo

Bn1&2

mf

75

81

85

mp ————— f ————— p
mp ————— f ————— p
mp ————— f ————— p

tutti 3 3 3 3

p ————— mf ————— p

Bb Tpts

3&4

Hns (F)

3&4

Tr

1&2

Base Tn open

sffz mf

3&4

Euph

Tb

Piano

Large Tamtam
bow on edge

Gong ("G")

dead strokes

f

Pr 1

Pr 2

Pr 3

Pr 4

Lion's Roar
coda: Bass Drum/superball drag

Pr 5

ff (solo)

Pr 6

hard yarn mallets mp ————— f

bow on edge

75

81

85

Match all *sffz* entrances: very brassy and rude!

Tn 3 open

1. solo 1/2 1 2. solo 1/2

mf ————— p mf ————— p

IV III
2. solo

sffz mf

sffz mf sffz mf sffz mf sffz mf

sffz mf sffz mf sffz mf sffz mf

sffz mf sffz mf

Large Suspended Cymbal
Small Susp. Cymbal
dome

Picc.

Fl1&2

Ob1&2

E(Cl)

1 Bb Cl 2

3 Bs Cl

Bb Cb Cl

S Sx

ASx1&2

T Sx

B Sx

Bn1&2

1&2 Bb Tpts

3&4

1&2 Hns (F)

3&4

1&2 Tn

3&4

Euph

Tb

Piano

Pré 1

Gong (B♭)

Pré 2

mf

Pré 3

Large Suspended Cymbal

Small Susp. Cymbal dome

Pré 4

hard yarn mallets mp

f

Pré 5

Pré 6

Crotale

hard plastic mallets p

100

100

106

18.2
Bb Tpts

3&4

18.2
Hns (F)

3&4

solo cup muted E 1/4-tone flat

18.2
Tn

3&4

Euph

Tb

Piano

Celesta

Pre 1

Pre 2

Marimba

Pre 3

Pre 4

Wood Blocks

Pre 5

hard rubber mallets *mf* (match winds)

Pre 6

110

111

115

Picc.

Fl1&2

Ob1&2

(flowing)

E♭Cl

B♭ Cl 1

B♭ Cl 2

B♭ Cl 3

B♭ Cl

B♭ Cb Cl

S Sx

ASx1&2

TSx

Bsx

Bn1&2

111

115

B♭ Tpts

1&2 Hns (F)

3&4

1&2 Tn

3&4

Euph

Tb

Celesta

1. solo open half-valve gliss.

2. solo open

p

f

f

mf

(Xylophone)

Pre 1

p

Brake Drum
hard plastic mallet

Pre 2

f

f

(Marimba)

Pre 3

p

(Crotales)

Pre 4

#

(Wood Blocks)

Pre 5

Pre 6

Police Whistle

Picc.

Fl1&2 *mp f mp p*

Ob1&2

E♭Cl *ff, staccatissimo*

B♭ Cl 1 *mp f mp p*

B♭ Cl 2 *mf mp p*

B♭ Cl 3 *mf mp p*

B♭ Cl 4 *ff, staccatissimo*

B♭ Cl 5 *ff, staccatissimo*

B♭ Cl 6 *ff, staccatissimo*

B♭ Cl 7 *ff, staccatissimo*

B♭ Cl 8 *ff, staccatissimo*

B♭ Cl 9 *ff, staccatissimo*

B♭ Cl 10 *ff, staccatissimo*

B♭ Cl 11 *ff, staccatissimo*

B♭ Cl 12 *ff, staccatissimo*

B♭ Cl 13 *ff, staccatissimo*

B♭ Cl 14 *ff, staccatissimo*

S Sx

A Sx1&2 *ff, staccatissimo*

T Sx

B Sx

B♭n1&2 *tutti ff, staccatissimo*

B♭ Tpts 1 *p f mp p*

B♭ Tpts 2 *mf mp p*

Hns (F) 1&2

Hns (F) 3&4

Euphonium 1 *p*

Euphonium 2 *mf*

Euphonium tutti *f*

Trs *f*

Euph *f*

Tbs *f*

Celesta

Prc 1

Prc 2

Prc 3

Prc 4

Prc 5 *3 Tomtoms wood sticks f High Bongo (hands)*

Prc 6

very legato — like the cry of a wounded beast!

Piano *ff, staccatissimo*

Xylophone *Small Gong ("ff") mp*

Slit Drum - 2 pitches *hard rubber mallets*

Timpani *hard mallets f mp*

Picc.

F1l&2

Ob1&2

E(Cl)

Bb Cl 1

Bb Cl 2

Bb Cl 3

Bs Cl

Bb Cb Cl

S Sx

ASx1&2

TSx

BSx

Bn1&2

1&2

Bb Tpts

3&4

1&2

Hns (F)

3&4

1&2

Tn

3&4

Euph

Tb

Piano

(Xylophone)

Pre 1

(Gong)

Pre 2

mf

Medium Hand Drum

Pre 3

mf held in the air with one hand and struck with the other (ritualistic visual effect)

Crotales

Pre 4

Small Susp. Cymbal

Slit Drum

Pre 5

(Timpani)

Pre 6

ff

tutti

f

mf

Picc.

Ft1&2

tutti

Ob1&2

f

E(Cl)

1

Bb Cl

2

3

Bs Cl

Bb ChCl

S Sx

ASx1&2

Tsx

Bsx

Bn1&2

tutti

1&2

Bb Tpts

3&4

Brass repeated notes very legato, rich, full-toned

Horn 1 open to half-stopped

B 1/4-tone flat

Hns (F)

3&4

1&2

Tr

3&4

Euph

Tb

Piano

Glockenspiel

Vibraphone

Almglocke

Bass Drum

soft rubber mallets mp

Prcl

Prc2

p

Prc3

Prc4

Prc5

pp

f

Prc6

Picc. *E 1/4-tone flat*

F1 & 2 *p*

Ob1 & 2 *p*

E Cl *C 1/4-tone sharp*

Bb Cl 1 *pp < f =>*

Bb Cl 2 *pp < f =>*

Bb Cl 3 *pp < f =>*

Bs Cl

B♭CbCl

S Sx

ASx1 & 2

TSx

BSx

Bn1 & 2

1 solo

mp (solo)

tutti
practice mutedtutti
practice muted

pp < f => pp

Bb Tpts

Hns (F)

Tn

Euph

Tb

1 solo

pp < f => pp

practice muted

E 1/4-tone flat

Piano

(Glockenspiel)

Prc 1

(Vibraphone)

Prc 2

Prc 3

(Almglocke)

Prc 4

Prc 5

Prc 6

Chimes fiberglass hammer

no pedal *mp*