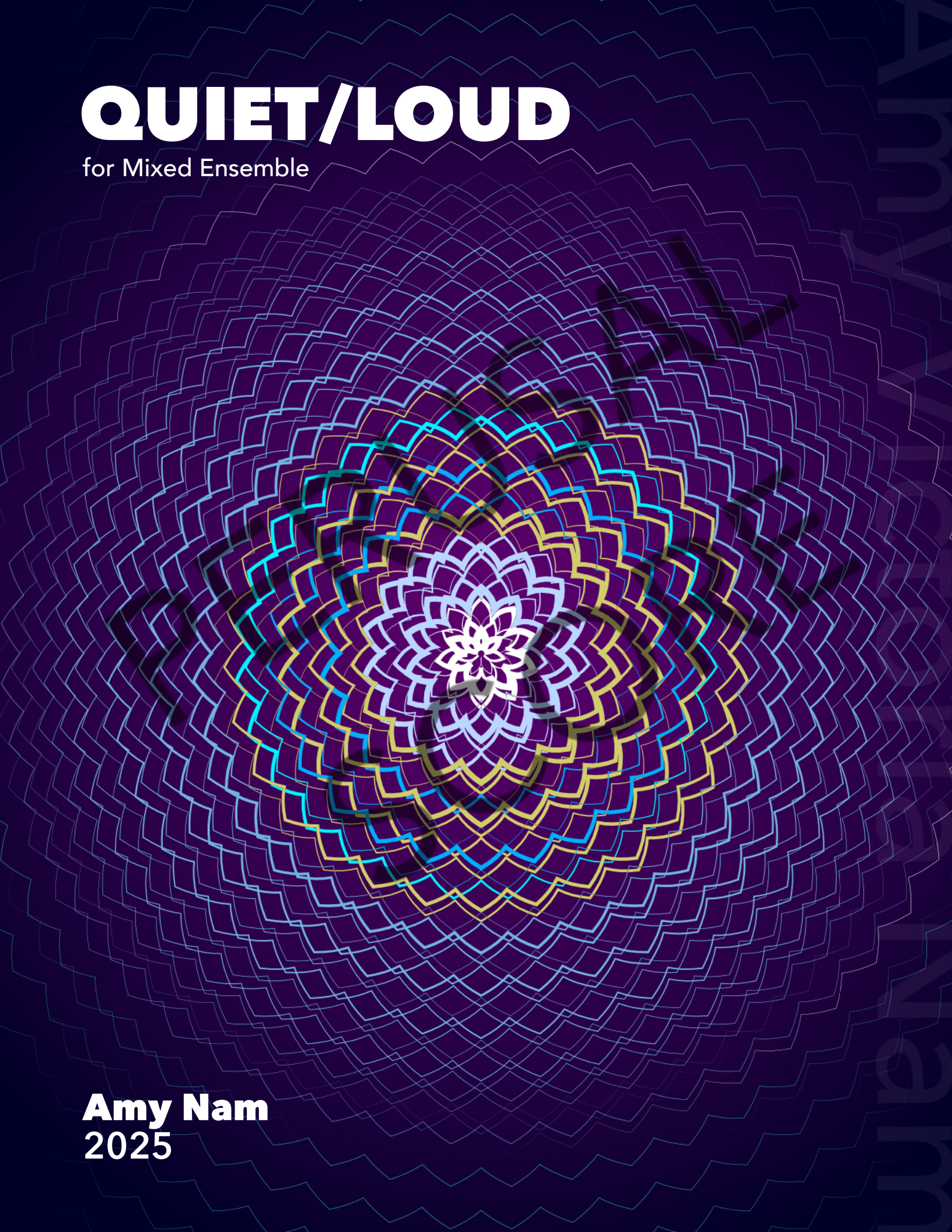


QUIET/LOUD

for Mixed Ensemble

Amy Nam
2025



Duration

7:20

Instrumentation

Flute
Clarinet in B-flat
Piano
Electric Guitar
Double Bass
(with C extension)
Live electronics

Performance notes for electronics

All instruments should be mic'ed and routed (except for the electric guitar, which can be directly routed) through a central interface/laptop for processing before being amplified. They will not require separate processing and can be bussed through one channel.

The electronic part can be performed using any DAW with a reverb effect and pitch shifter effect that can be adjusted live. It is necessary to gradually adjust two parameters at once, so a midi device with knob controllers is recommended. The score indicates a section of music that is to be recorded and played back on loop with processing later on in the piece. This section could either be recorded in advance of the performance or could be recorded live.

The Electronics cue line includes both descriptions of the intended sound and specifications for what effects to use if the electronics are operated with Logic, including specific parameter values. Please use your judgement and adjust the parameter values as suits the performance space in order to achieve the described sound, even if that means setting a parameter value at a very different level than the one indicated.

Program notes

At first glance, the subatomic world seems wild with chaos. Wave functions governing the energy and potential of quantum states combine and separate in polyrhythmic interference. Electrons bob from orbital to atomic orbital without bothering to traverse the intervening space. Ever-present environmental entropy rudely interferes with particles that are somehow occupying multiple places simultaneously.

At first glance, the subatomic world seems chaotic. And yet—it's not. Not quite.

QUIET (Quantum Underground Instrumentation Experimental Testbed) and LOUD are the names of a pair of labs at Fermi National Accelerator Laboratory, or Fermilab, the United States' premier particle accelerator lab, located in Batavia, Illinois. LOUD sits on the earth's surface while QUIET nestles underground beneath 100 meters of rock that shields the lab from most of the high-energy cosmic rays that constantly rain down from outer space to invisibly bombard our planet. Together, these labs carry out controlled experiments measuring the effect of cosmic rays on qubits.

Qubits, or quantum bits, perform calculations in quantum computers. They are similar to "traditional" bits in "normal," classical computers, in that they can, in theory, be designed in a variety of possible mediums, so long as they properly store information to allow for the performance of logical operations. However, unlike classical bits, which can only be in one state at a time (either off or on, 0 or 1), quantum bits can be in a "superposition" of states. This means qubits can occupy both states (0 and 1) at the same time, allowing multiple mathematical operations to be carried out simultaneously.

Through conversation with the amazing scientists at Fermilab, I learned about the exciting process that ensues when qubits are put into action.

First, scientists initialize several qubits (an "array" of qubits) to their desired superposition states. For a brief moment of time, the qubits remain in their superpositions and are able to perform calculations as intended. The state of the qubits at this moment can be imagined as a complex system of many simultaneous waves, each with a different amplitude and period that correlates with the qubit's probability of possessing a particular potential energy. The composition of these waves fluctuates as the qubits undergo algorithmic operations that alter the probability of their states of potential energy.

However, this moment doesn't last for long. Very quickly (within microseconds!) the qubits begin to "decohere" from their superposition states. Each qubit returns to being in just one state, its "ground state," the state of lowest possible potential energy. Within an array of qubits, the decoherence of each qubit usually happens out of sync from the others. This decoherence happens "naturally," simply because the qubits are affected by the "noise" of their subatomic environment, such as minuscule temperature fluctuations or tiny amounts of radioactive decay from nearby materials. In addition to this naturally-occurring decoherence, and of special interest to the QUIET/LOUD labs, more drastic (but also less frequent) decoherence is caused by cosmic rays, such as the X-rays that emanate from the sun's solar corona. A cosmic ray can add a huge amount of energy to a qubit, suddenly knocking the qubit, or possibly several qubits, out of superposition back to the ground state or even to an entirely different value. Inside a quantum computer, a qubit that has undergone decoherence would immediately be detected and re-initialized to its previous superposition state.

In QUIET/LOUD, these quantum processes find musical analogy in three ways. First, I employ a fabric of spinning gestures that continually, asynchronously, wind down before immediately "rebooting," expressing the constant process of decoherence. Additionally, musical melodies and motives echo around the ensemble at different rates, enacting constructive and deconstructive interference patterns that evoke the complex wave function describing a qubit array's fluctuating quantum states. And as a final analogy, a cosmic ray strikes in the form a moment of extreme energy, bringing the music to its state of lowest energy. Taken together, these music processes offer a sonic impression of what might be experienced on the quantum level: complexity that looks chaotic at first, but is in fact highly organized until disturbed.

QUIET/LOUD was commissioned by fivebyfive for premiere in their October 2025 season concert "Subatomic Mysteries" and was written during my residence as the 2025 Fermi Forward Discovery Group Guest Composer.

I give my heartfelt thanks to Fermilab scientists Doğa Kürkçüoğlu and Silvia Zorzetti for their time, generosity, expertise, and conversation; to Natalie Johnson, Head of the Office of Education and Public Engagement at Fermilab; and to Georgia Schwender, Visual Arts Coordinator and founder of the Fermilab artist-in-residence program. My warmest gratitude extends to Laura Lentz, Artistic Director of fivebyfive, for her creative vision and execution in commissioning this piece and its companions, all inspired by our amazing subatomic world.

—Amy Nam (b. 1994)

QUIET/LOUD

(for fivebyfive)

Amy Nam

Fragile, nebulous, gently pulsing (♩ = c. 66)

Flute

Clarinet in Bb

Piano

Electric Guitar

Double Bass

Electronics

Space Designer (main channel, all instruments):
can use preset "1.3s Diffuse Hall" ("Default Preset" > "03 Small spaces" > "02 Halls")
Predelay: 0ms; Length 1.31s; Size: 100%; Dry: 0.0 dB; Wet -10.0 dB
Should sound like a small, live space with reverb that is just noticeable

4

Fl. *mp*

Cl. in Bb *flz. mp*

Pno *mp*

E. Gtr

D. B. *p*

E.

7

Fl. *pp*

Cl. in Bb *pp*

Pno *pp*

E. Gtr

D. B.

E.

Space Designer (main channel):
Size: 110%
Should sound like a slightly larger, less "real" space with more present reverb

double glissando on natural harmonics
begin with very high partials and gradually go lower
begin sparsely and increase energy

arco

pp

mp

START recording dry signal
(can be recorded in advance or in performance)

flz.

mp

flz.

13

Fl.

mp

pp

Cl. in Bb

mp

pp

Pno

8va

mp

pp

E. Gtr

D. B.

arco

pizz.

arco

pizz.

E.

5/4

4/4

PERUSKORE

14

Fl.

flz.
mp *pp*

Cl. in Bb

flz.
mp *pp*

Pno

pp *mp*

E. Gtr

f *pizz.* *arco*

D. B.

f *pizz.* *arco*

E.

STOP recording dry signal

15

Fl.

flz.
mp *pp*

Cl. in Bb

flz.
mp *pp*

Pno

pp *mp* *pp*

E. Gtr

pizz. *arco*

D. B.

ppp

E.

ppp

Space Designer (main channel):
Size: 100%
Return to feeling of smaller space

Agitated (l'istesso tempo)

18

Fl.

Cl. in B♭

Pno

E. Gtr

D. B.

E.

Space Designer (main channel):
Size: 100%
Return to feeling of smaller space

21

Fl.

Cl. in B♭

Pno

E. Gtr

D. B.

E.

23

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

26

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

PREVIEW

28

Fl.

pp 3 flz. > f 3 3 pp f pp

Cl. in B♭

pp flz. > f 3 3 pp

Pno

(8) f p f p f p 8va > 3 3 3 3 3 3 3 3

E. Gtr

(8)

D. B.

f p

E.

3 4 4 4

PERUSSA SCORE

30

Fl.

Cl. in B \flat

Pno

E. Gtr

D. B.

E.

f *pp* *f* *pp*

f *p* *f* *p*

mp

8^{va} sul E 8^{va}

fp *f* *p* *fp*

33

Fl.

Cl. in B \flat

Pno

E. Gtr

D. B.

E.

Moving ahead slightly ($\text{♩} = \text{c. } 72$)

pp *3* *3* *3* *3*

pp

(8)

Space Designer (main channel):
Size: 110%
Return to slightly larger, less "real" space with more present reverb

36

Fl.

Cl. in Bb

Pno *pp*

E. Gtr

D. B.

E.

arco

glissando on natural harmonics
begin with very high partials and gradually go lower
begin sparsely and increase energy

pp

38

Fl.

Cl. in Bb

Pno

E. Gtr *mf*

D. B. *mf*

E.

pizz.

The musical score is for a 12-measure piece, measures 36-38. The score is for a full orchestra, including Flute, Clarinet in Bb, Piano, Electric Guitar, Double Bass, and Drums. Measures 36-38 show a complex texture with triplets in the woodwinds and piano, and a glissando on natural harmonics in the double bass. The dynamic range is from pp to mf.

Fl. *flz.* *mf* *pp* *mf* *pp*

Cl. in Bb *flz.* *mf* *pp* *mf* *pp*

Pno *8va* *mf* *pp* *mf*

E. Gtr

D. B. *arco* *pizz.* *arco*

E.

Fl. *flz.* *mf* *pp* *mf* *pp* *f*

Cl. in Bb *flz.* *mf* *pp* *f* *pp* *f*

Pno (8) *pp* *mf* *pp* *mf* *pp* *f*

E. Gtr

D. B. *pizz.* *arco*

E.

3/4

44

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

47

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

PERUSARE

gliss.

f

f *pp* *f* *pp* *ff*

(8)

p *f*

sul E

sul G

sul D

fp *fp* *fp* *fp*

gliss.

pp *f*

f *pp* *f* *p*

f *p* *f* *3*

f

pizz.

arco

pizz.

49

Fl.

gliss.

flz.

flz.

Cl. in Bb

pp \longrightarrow *ff*

f *p* *f*

Pno

f *ff* *f*

E. Gtr

pizz.

arco

D. B.

gliss.

fp *f*

E.

51

Fl.

pp *f*

Cl. in Bb

pp *f* *p* *pp* \longrightarrow *ff*

Pno

f *ff* *fff*

E. Gtr

pizz.

arco

D. B.

gliss.

fp

E.

The image displays a page from a musical score for the song "The Rose Tree." The score is written for a piano and a vocal soloist. The piano part is in 3/4 time and features a variety of musical notations, including dynamics (f, pp), articulation (>), and triplets. The vocal part is written for Soprano, Alto, Tenor, and Bass, with the Soprano part being the most prominent. The score includes a large "PERUSIA SCORE" watermark across the page.

55

Fl.

f

Cl. in Bb

pp

f

Pno

p

f

pp

E. Gtr

f

pp

D. B.

arco

E.

3/4

4/4

57

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

59

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

PERUSAL

66

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

68

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

Gradually increase 0 to 100% of the sound to also be sent through a bus to an aux channel with different settings:

Space Designer (aux channel): can use preset "Default Preset" with adjusted "Length" and "Wet"

Predelay: 11ms; Length **24.0s**; Size: 100%; Dry: 0.0 dB; Wet **-10.0 dB**

Pitch Shifter (aux channel):

Semi Tones: **-1**; Mix: **0%** (for now)

From here to m. 74, instruments should gradually become drowned out in delay

69

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

flz.

flz.

(8)

pizz.

The musical score for measures 69-72 is as follows:

- Flute (Fl.):** Measures 69-72. Measure 69: Flute 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), Flute 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 70: Flute 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), Flute 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 71: Flute 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), Flute 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 72: Flute 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), Flute 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4).
- Clarinet in Bb (Cl. in Bb):** Measures 69-72. Measure 69: Clarinet 1 (Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3), Clarinet 2 (Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3). Measure 70: Clarinet 1 (Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3), Clarinet 2 (Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3). Measure 71: Clarinet 1 (Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3), Clarinet 2 (Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3). Measure 72: Clarinet 1 (Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3), Clarinet 2 (Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3, Bb3).
- Piano (Pno):** Measures 69-72. Measure 69: Piano 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), Piano 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 70: Piano 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), Piano 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 71: Piano 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), Piano 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 72: Piano 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), Piano 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4).
- Electric Guitar (E. Gtr):** Measures 69-72. Measure 69: E. Gtr 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), E. Gtr 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 70: E. Gtr 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), E. Gtr 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 71: E. Gtr 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), E. Gtr 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4). Measure 72: E. Gtr 1 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4), E. Gtr 2 (F4, F#4, G4, A4, Bb4, A4, G4, F#4, F4).
- Double Bass (D. B.):** Measures 69-72. Measure 69: D. B. 1 (F2, F2, F2, F2, F2, F2, F2, F2, F2), D. B. 2 (F2, F2, F2, F2, F2, F2, F2, F2, F2). Measure 70: D. B. 1 (F2, F2, F2, F2, F2, F2, F2, F2, F2), D. B. 2 (F2, F2, F2, F2, F2, F2, F2, F2, F2). Measure 71: D. B. 1 (F2, F2, F2, F2, F2, F2, F2, F2, F2), D. B. 2 (F2, F2, F2, F2, F2, F2, F2, F2, F2). Measure 72: D. B. 1 (F2, F2, F2, F2, F2, F2, F2, F2, F2), D. B. 2 (F2, F2, F2, F2, F2, F2, F2, F2, F2).
- Electric Bass (E.):** Measures 69-72. Measure 69: E. 1 (F2, F2, F2, F2, F2, F2, F2, F2, F2), E. 2 (F2, F2, F2, F2, F2, F2, F2, F2, F2). Measure 70: E. 1 (F2, F2, F2, F2, F2, F2, F2, F2, F2), E. 2 (F2, F2, F2, F2, F2, F2, F2, F2, F2). Measure 71: E. 1 (F2, F2, F2, F2, F2, F2, F2, F2, F2), E. 2 (F2, F2, F2, F2, F2, F2, F2, F2, F2). Measure 72: E. 1 (F2, F2, F2, F2, F2, F2, F2, F2, F2), E. 2 (F2, F2, F2, F2, F2, F2, F2, F2, F2).

70

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

flz.

flz.

arco

Pitch Shifter (aux channel):
 From here to m. 74, gradually increase "Mix" from 0 to 50%
 The amplified sound should become chromatically saturated; chaotic

72

Fl.

flz.

Cl. in Bb

(8)

Pno

E. Gtr

D. B.

E.

This musical score is for the song "The Sound of Silence" by Simon & Garfunkel. It is arranged for a six-piece ensemble. The score begins at measure 73. The Flute (Fl.) and Clarinet in Bb (Cl. in Bb) parts feature melodic lines with triplets and slurs. The Piano (Pno) part includes a forte (ff) dynamic marking and features complex chordal textures with triplets. The Electric Guitar (E. Gtr.) part plays a rhythmic pattern of eighth notes with triplets. The Double Bass (D. B.) part provides a steady bass line with triplets. The Drums (E.) part is represented by a simple drum line with a kick drum and snare drum pattern.

74

wait approx. 30 seconds until cue from electronics

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

75

82

82

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

n

pp

n

p

n

p

n

wait approx. 5-10 seconds
until cue from electronics

wait approx. 5-10 seconds
until cue from electronics

wait approx. 5-10 seconds
until cue from electronics

wait approx. 5-10 seconds
until cue from electronics

wait approx. 5-10 seconds
until cue from electronics

continue bringing Pitch Shifter mix up to 50%
Approx. 5-10 seconds
Cue piano to continue when mix reaches 50%

Pitch Shifter (recorded loop channel):
gradually increase mix to 0 to 50%
through end of fermata measure

Anticipatory, forward looking (♩ = c. 72)

pp

p

Pitch Shifter (recorded loop channel):
gradually reduce mix from 50 to 0% through measure 97
piano should enter "under" the sound of the recorded loop

This image shows a musical score for measures 93-95 of the song "The Sound of Silence" by Simon & Garfunkel. The score is arranged for a full band, including Flute (Fl.), Clarinet in B-flat (Cl. in Bb), Piano (Pno), Electric Guitar (E. Gtr), Double Bass (D. B.), and Drums (E.).

Measure 93: The Flute and Clarinet in B-flat play a melodic line with triplets and slurs. The Piano plays a complex accompaniment with triplets in the right hand and a steady eighth-note bass line in the left hand. The Electric Guitar, Double Bass, and Drums are silent in this measure.

Measure 94: The Flute and Clarinet in B-flat continue their melodic line. The Piano's accompaniment remains consistent. The Electric Guitar, Double Bass, and Drums are still silent.

Measure 95: The Flute and Clarinet in B-flat play a melodic line. The Piano's accompaniment continues. The Electric Guitar, Double Bass, and Drums are still silent.

The score is marked with a large, diagonal watermark reading "PERUSARE".

97

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

99

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

3

This musical score page contains measures 97 through 100. The instrumentation includes Flute (Fl.), Clarinet in Bb (Cl. in Bb), Piano (Pno), Electric Guitar (E. Gtr), Double Bass (D. B.), and Drums (E.). Measures 97 and 99 feature complex melodic lines for the Flute and Clarinet, often marked with triplets. The Piano part provides a steady accompaniment with eighth-note patterns. The Electric Guitar and Double Bass parts are more rhythmic, with the Double Bass featuring a triplet in measure 100. The Drums part is indicated by a double bar line and a vertical line, suggesting a specific drum pattern. The score is marked with a '3' in measure 100, likely indicating a triplet or a specific tempo change. A large, diagonal watermark reading 'PREVIEW' is overlaid across the center of the page.

[illegible]

This musical score is for the instrumental introduction of "The Sound of Silence" by Simon & Garfunkel. It features a piano (Pno) and woodwind section (Fl. and Cl. in Bb). The piano part begins with a melody in the right hand and a bass line in the left hand, both featuring triplet patterns. The woodwind section enters with a melody in the flute and a bass line in the clarinet, both marked with a piano (*p*) dynamic and a "sub." (sustained) marking. The score is written for a full orchestra, with the piano and woodwind parts being the focus of this section.

105

Fl. *f*

Cl. in Bb *f*

Pno *f*

E. Gtr *f*

D. B. *f*

E.

107

Fl. *flz.*

Cl. in Bb *flz.*

Pno *8va*

E. Gtr

D. B.

E.

Recorded loop channel:
gradually fade out volume to silence through m. 110

rit.

Reflectively (♩ = c. 66)

109

Fl.

Cl. in Bb

Pno

E. Gtr

D. B.

E.

Reflectively (♩ = c)

fff

p

pp

fff

pp

fff

pp

This musical score is for the song "The Sound of Silence" by Simon & Garfunkel. It is a full orchestration featuring six instrumental parts: Flute (Fl.), Clarinet in Bb (Cl. in Bb), Piano (Pno), Electric Guitar (E. Gtr), Double Bass (D. B.), and Drums (E.). The score is written for a 4/4 time signature. The Flute part begins with a melodic line starting on a whole note G4, followed by a series of eighth and sixteenth notes. The Clarinet in Bb part provides a harmonic accompaniment, often playing sustained notes. The Piano part features a prominent bass line with a mix of whole and half notes, including dynamic markings like *pp* (pianissimo) and *p* (piano). The Electric Guitar part plays a melodic line with a mix of eighth and sixteenth notes, often using a capo. The Double Bass part provides a steady rhythmic foundation with a mix of eighth and sixteenth notes. The Drums part is represented by a series of vertical lines indicating the timing of the drum hits. The score is marked with a large "113" at the top left, indicating the page number. A large, semi-transparent "SCORE" watermark is visible across the center of the page.