

# LIGO

*by Alissa Voth  
for flute and tape  
written for Antonina Styczen*

## PROGRAM NOTES

The sounds you are hearing consist of sonified data from The Laser Interferometer Gravitational-Wave Observatory (LIGO). The Observatory successfully detected gravitational waves from an event that occurred billions of years ago where two black holes were pulled into each others' orbit, which secured the researchers a Nobel Prize in physics. The relationship between the audio and the performer is meant to represent these two black holes and their interactions - the inspiral, where the two are pulled into each others orbit, the merger, where they collide, and the ringdown, where they unify. Through this tension, I also mean to demonstrate two ways we can experience cosmic phenomena: scientifically, through observation, and expressively, through the imagination. Thanks to Antonina Styczen for being a powerful performer and collaborator.

## PERFORMANCE NOTES

X noteheads are percussive, aerated sounds. Wavy line are glissandi, either up or down depending on the notation. Arrow noteheads indicate playing the highest note you can. The piece is separated into three sections - the Inspiral, Merger, and Ringdown. The Inspiral is a series of loops, the first of which is a minute long. It is the performer's job to fit each line of music on the page into each of the 17 loops during this section. You will hear the separation of the sections with a little "bwooOOOP" sound. Some sections are too short to fit all of the material into - this is on purpose. The performer is a lower-mass black hole being sucked into a larger-mass black hole, so the track should dominate and destroy the performer by the end of the Inspiral. The Merger and Ringdown are temporal with explanations on their pages. Optional for theatricality: perform this piece in total darkness and amplified.

# INSPIRAL

0'0"-4'06"

This musical score consists of 15 staves of music. Each staff begins with a treble clef and a key signature of one flat (B-flat). The music is characterized by a consistent rhythmic pattern of eighth notes, often with a dotted eighth note followed by a sixteenth note. The dynamics are marked with *f* (forte), *ff* (fortissimo), *p* (piano), *sub.p* (sub-piano), and *P* (pianissimo). The score includes various musical notations such as slurs, accents, and a '5' indicating a quintuplet. The piece concludes with a final *P* dynamic marking.

# MERGER

4'07"-4'15"

58

*ff*

This section consists of three measures. Measure 58 starts with a treble clef and a whole note G4. Measure 59 contains a whole rest. Measure 60 features a whole note G4. A long slur spans across all three measures, with the dynamic marking *ff* centered below it.

# RINGDOWN

4'16"-5'06"

59

*sempre p*

This section begins at measure 59 with a treble clef and a whole note G4. It continues with a series of notes and rests, including a half note G4, a quarter note G4, and various chromatic and diatonic passages. The dynamic marking *sempre p* is placed below the first measure.

69

This section contains measures 69 through 76. It features a complex rhythmic pattern of eighth and sixteenth notes, many of which are marked with an 'x' to indicate specific articulation or bowing techniques.

77

This section contains measures 77 through 80. It continues the rhythmic pattern from the previous measures, ending with a double bar line and repeat dots.

# 5'07"-END

81

*ord.* *wind tone* *p*

This section consists of two measures. Measure 81 starts with a treble clef and a whole note G4. Measure 82 features a whole rest. The dynamic marking *p* is placed below measure 82. The notes in measure 81 are labeled with *ord.* and *wind tone*.