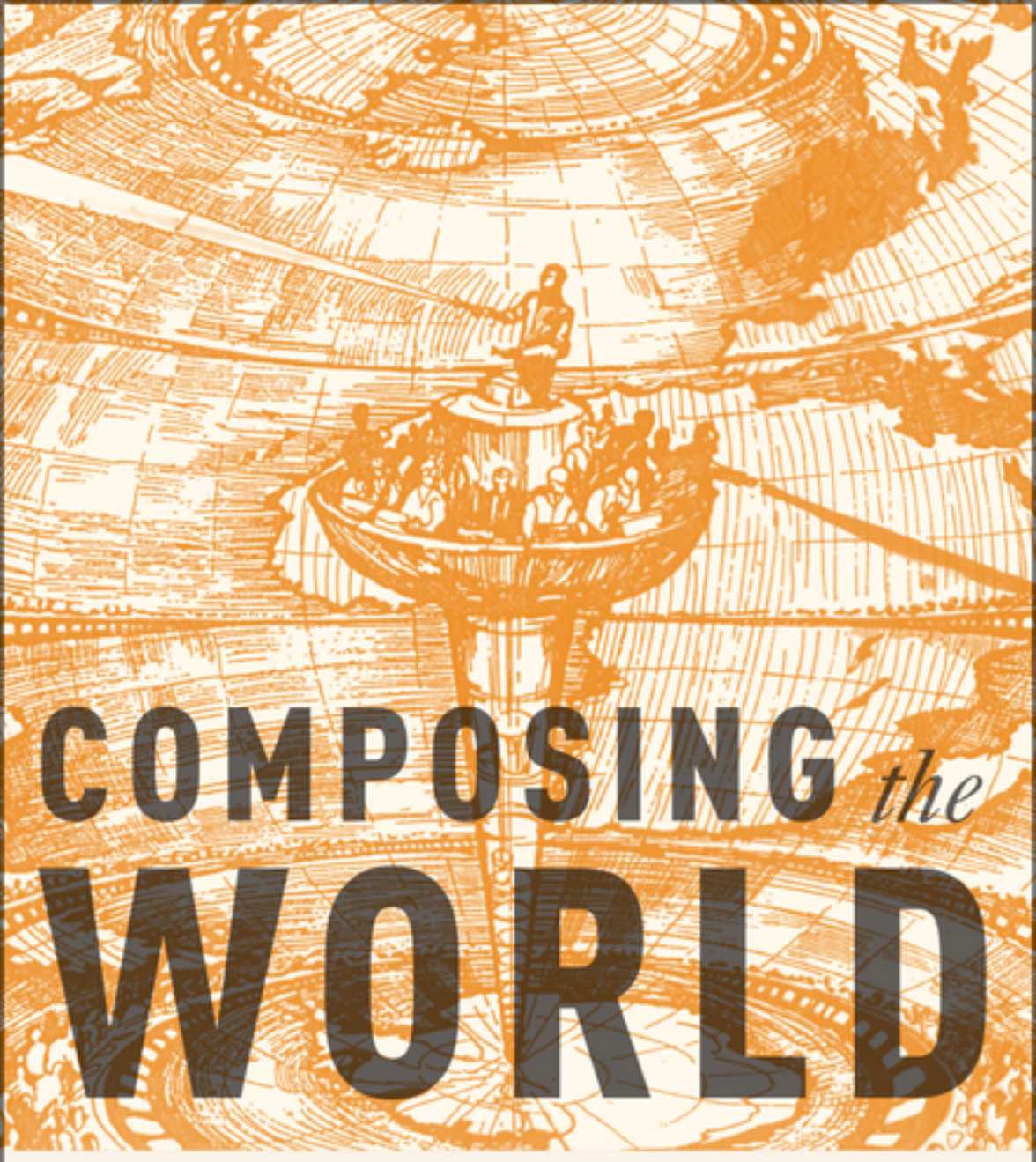

COMPOSING *the* WORLD

Harmony in the Medieval Platonic Cosmos

ANDREW HICKS

Composing the World

Critical Conjunctures in

Music & Sound

Series Editors Jairo Moreno and Gavin Steingo

Composing the World: Harmony in the Medieval Platonic Cosmos, Andrew Hicks

Composing the World

Harmony in the Medieval Platonic Cosmos

ANDREW HICKS

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Meo magistro et amico, Eduardo Jeauneau, seni Carnotensi et opulentissimo grammatico post Guillelmum de Conchis.

CONTENTS

SERIES EDITORS' FOREWORD

Critical Conjunctures in Music and Sound offers a space from which to engage urgent questions currently animating the humanities from the perspectives of music, sound, and listening. Tied together by a common epistemological attitude, the books in this series reconstitute the place of scholarship in response to a world rapidly transforming under economic and technological integration, on the one hand, and political and social disintegration, on the other. Authors articulate new musical and sonic relations to the composition of the political, the social, and the economic, while developing new ways to analyze music's ever-shifting associations with aurality, human/nonhuman divides, materiality, nature, and ontology. These relations and associations in turn provoke new questions about the past, and a reassessment of our historical and ethnographic priorities—both empirical and speculative. The series urges philosophical and theoretical critique to mediate and question the relationship of music studies to other forms of knowledge production. What it proposes, therefore, is a form of conjunctural analysis that does not foreclose in advance how sound, music, and other forces are or have been articulated together. "Conjuncture" captures the immediate and mobile sets of circumstances determining the present, which authors engage by challenging theoretical categories and forms from a variety of disciplinary, historical, or geographical homes.

Jairo Moreno and Gavin Steingo

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Many *demiourgoi* had a hand in the creation of this world of words, whose cosmogony spanned three institutions. At the Eastman School of Music, where its first seeds were sown, I thank in the first instance Gabriela Currie (now at the University of Minnesota), who has seen this project through every stage of its development, as well as Patrick Macey, Martin Scherzinger, and Roger Freitas, who accepted and fostered my peculiar brand of musicology. At the Centre for Medieval Studies, University of Toronto, I thank John Magee and Peter King, who expertly advised the doctoral work that grew into the larger project that fills these pages; A. G. Rigg, who patiently read with me many of the Latin texts that populate its pages; Brad Inwood, who generously accepted me as an interloper in the Collaborative Programme in Ancient and Medieval Philosophy, whose Greek and Latin reading groups and seminars exemplified the patient analysis of ancient and medieval texts; and Fr. Édouard Jeauneau, whose mentorship, guidance, and friendship has made this book possible. Over the past five years, my colleagues at Cornell University (the Department of Music, Program in Medieval Studies, and the Department of Classics) have provided an engaging environment for the project's final stages. In particular, I thank Andy Galloway, Judith Peraino, Charles Brittain, Scott MacDonald, Roger Moseley, and Pete Wetherbee, all of whom provided valuable feedback on early drafts of some (or all) of its chapters, as well as the graduate students (and colleagues) in my seminars on the history of music theory, Latin philosophical commentaries, and medieval cosmologies (co-taught with Benjamin Anderson).

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Scattered components of its argument have been published elsewhere: "Pythagoras and Pythagoreanism in Late Antiquity and the Middle Ages," in *A History of Pythagoreanism*, ed. Carl Huffman, 416–434 (Cambridge: Cambridge University Press, 2014), with permission from Cambridge University Press; "Martianus Capella and the Liberal Arts," in *The Oxford Handbook of Medieval Latin Literature*, ed. David Townsend and Ralph Hexter, 307–334 (Oxford: Oxford University Press, 2012), with permission from Oxford University Press; and "*Musica speculativa* in the Cambridge Commentary on Martianus Capella's *De nuptiis*," *Journal of Medieval Latin* 18 (2008), 292–305, with permission from Brepols Publishers. Dialogue from *The Late Show with Stephen Colbert* is courtesy of the Late Show Inc. For permission to reproduce images, I thank the Walters Art Museum; the Master and Fellows of Trinity College, Cambridge; Corpus Christi College Library, Oxford; and Lennart Lannerbäck.

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ABBREVIATIONS

Abelardus, *Dial.*	L. M. De Rijk, *Petrus Abaelardus. Dialectica: First Complete Edition of the Parisian Manuscript* (Assen: Van Gorcum, 1956; rev. ed. 1970).
Abelardus, *Exp. Hex.*	M. Romig, D. E. Luscombe, and C. Burnett, eds., *Expositio in Hexameron*, Corpus Christianorum. Continuatio Mediaevalis 15 (Turnhout: Brepols, 2004).
Abelardus, *LI1*	Bernhard Geyer, ed., *Peter Abaelards Philosophische Schriften. I. Die Logica 'Ingredientibus'. 1. Die Glossen zu Porphyrius*, Beiträge zur Geschichte der Philosophie und Theologie des Mittelalters 21.1 (Münster: Aschendorff, 1919).
Abelardus, *LI2*	Bernhard Geyer, ed., *Peter Abaelards Philosophische Schriften. I. Die Logica 'Ingredientibus'. 2. Die Glossen zu den Kategorien*, Beiträge zur Geschichte der Philosophie und Theologie des Mittelalters 21.2 (Münster: Aschendorff, 1921).
Abelardus, *TChr*	*Theologia Christiana* in E. M. Buytaert, ed., *Petri Abaelardi Opera theologica II*, Corpus Christianorum. Continuatio Mediaevalis 12 (Turnhout: Brepols, 1969).
Abelardus, *TSch*	*Theologia 'Scholarium'* in E. M. Buytaert and C. J. Mews, eds., *Petri Abaelardi Opera theologica III*, Corpus Christianorum. Continuatio Mediaevalis 13 (Turnhout: Brepols, 1987), 313–549.
Abelardus, *TSum*	*Theologia 'Summi boni'* in Buytaert and Mews, *Petri Abaelardi Opera theologica III*, 85–201.

Adelardus, *De eod. et diu.*	*De eodem et diuerso* in Charles Burnett, ed. and trans., *Adelard of Bath, Conversations with His Nephew: On the Same and the Different, Questions on Natural Science and On Birds* (Cambridge: Cambridge University Press, 1998), 1–79.
Adelardus, *Quaest. nat.*	*Quaestiones naturales* in Burnett, *Conversations*, 81–235.
Alanus de Insulis, *Anticl.*	Robert Bossuat, ed., *Alain de Lille. Anticlaudianus: Texte critique, avec une introduction et des tables* (Paris: J. Vrin, 1955).
Alanus de Insulis, *De pl. nat.*	Nikolaus M. Häring, "Alan of Lille, *De planctu Naturae*," *Studi medievali* 19 (1978), 797–879.
Alcinous, *Didask.*	John Whittaker, ed., *Alcinoos. Enseignement des doctrines de Platon*, trans. Pierre Louis (Paris: Belles lettres, 1990).
Ammonius, *In Isag.*	Adolf Busse, ed., *Ammonii In Porphyrii Isagogen sive V voces*, Commentaria in Aristotelem Graeca 4.3 (Berlin: Reimer, 1981).
Anonymus, *Exp. in Mart.*	*Expositio super librum Martiani Capelle de nuptiis philologie* iuxta Florence, Bib. Naz. Centrale, Conv. Soppr. I.1.28, ff. 49r–64v, et Zwettl, Stiftsbibliothek 313, ff. 142v–179v.
Anonymus, *Glos. Colonienses sup. Macr.*	Irène Caiazzo, *Lectures médiévales de Macrobe. Les* Glosae Colonienses super Macrobium, Études de philosophie médiévale 83 (Paris: J. Vrin, 2002).
Anonymus, *In inst. mus.*	Alexander Rausch, "Der Boethius-Kommentar in der Handschrift St. Florian XI 282," *Studien zur Musikwissenschaft: Beihefte der Denkmäler der Tonkunst in Österreich* 48 (2002), 7–83.
Aristoxenus, *El. harm.*	Rosetta Da Rios, ed., *Aristoxeni Elementa Harmonica*, Scriptores Graeci et Latini consilio Academiae Lynceorum editi (Rome: Typis publicae officinae polygraphicae, 1954).
Augustinus, *Trin.*	W. J. Mountain, *Sancti Aurelii Augustini De trinitate libri XV*, Corpus christianorum. Series Latina, 50–50A (Turnhout: Brepols, 1968).
Bernardus Carnotensis, *Bernardi Glos. sup. Tim.*	Paul Edward Dutton, ed., *The* Glosae super Platonem *of Bernard of Chartres*, Studies and Texts 107 (Toronto: Pontifical Institute of Mediaeval Studies, 1991).

Bernardus Silvestris, *Comm. in Mart.*	Haijo Jan Westra, ed., *The Commentary on Martianus Capella's* De nuptiis Philologiae et Mercurii *Attributed to Bernardus Silvestris*, Studies and Texts 80 (Toronto: Pontifical Institute of Mediaeval Studies, 1986).
Bernardus Silvestris, *Cos.*	Peter Dronke, ed., *Bernardus Silvestris. Cosmographia* (Leiden: Brill, 1978).
Boethius, *Cons. phil.*	Claudi Moreschini, ed., *Boethius. De consolatione philosophiae. Opuscula theologica*, Bibliotheca scriptorum Graecorum et Romanorum Teubneriana (Munich and Leipzig: K. G. Saur, 2005), 1–162.
Boethius, *De trin.*	Moreschini, *Boethius. De consolatione philosophiae. Opuscula theologica*, 165–181.
Boethius, *In Isag.*	Samuel Brandt, ed., *Anicii Manlii Severini Boethii In Isagogen Porphyrii commenta*, Corpus Scriptorum Ecclesiasticorum Latinorum 48 (Vienna: F. Tempsky, 1906).
Boethius, *In Perih.*	Carol Meiser, ed., *Anicii Manlii Severini Boetii commentarii in librum Aristotelis* ΠΕΡΙ ΕΡΜΗΝΕΙΑΣ (Leipzig: B. G. Teubner, 1877 and 1880).
Boethius, *Inst. ar.*	Henry Oosthout and Iohannes Schilling, eds., *Anicii Manlii Severini Boethii De arithmetica*, Corpus Christianorum. Series Latina, 94A (Turnhout: Brepols, 1999).
Boethius, *Inst. mus.*	Gottfried Friedlein, ed., *Anicii Manlii Torquati Severini Boetii De institutione arithmetica, libri duo. De institutione musica, libri quinque*, Bibliotheca scriptorum Graecorum et Romanorum Teubneriana (Leipzig: B. G. Teubner, 1867).
Calcidius, *In Tim.*	J. H. Waszink, ed., *Timaeus a Calcidio translatus commentarioque instructus*, 2nd ed., Plato Latinus 4 (London: The Warburg Institute, 1975).
Cassiodorus, *Inst.*	R. A. B. Mynors, ed., *Cassiodori Senatoris Institutiones divinarum et saecularium litterarum*, 2nd ed. (Oxford: Clarendon Press, 1961); PL 70, 1105–1220.
Eriugena, *De imag.*	Maïeul Cappuyns, "Le 'De imagine' de Grégoire de Nysse traduit par Jean Scot Érigène," *Recherches de théologie ancienne et médiévale* 32 (1965), 205–262.
Gregory of Nyssa, *De hom. op.*	*S. Gregorii Nysseni De hominis opificio*, PG 44, 123D–255C.

Guillelmus a Sancto Theodorico, *De nat. corp. et an.*	Michel Lemoine, ed., *Guillelmus de Sancto Theodorico, De natura corporis et animae*, Auteurs Latins du Moyen Âge (Paris: Belles lettres, 1988), 93–146.
Guillelmus de Conchis, *Drag.*	Italo Ronca, ed., *Guillelmi de Conchis Dragmaticon philosophiae*, Corpus Christianorum. Continuatio Mediaevalis 152 (Turnhout: Brepols, 1997).
Guillelmus de Conchis, *Glos. sup. Macr.*	*Glosae super Macrobium*, transc. Helen Rodnite Lemay (forthcoming in the *Guillelmi de Conchis Opera omnia*, Corpus Christianorum, Continuatio Mediaevalis)—Rodnite Lemay's transcriptions have been checked and corrected against the manuscripts when necessary.
Guillelmus de Conchis, *Glos. sup. Boet.*	Lodi Nauta, ed., *Guillelmi de Conchis Glosae super Boetium*, Corpus Christianorum. Continuatio Mediaevalis 158 (Turnhout: Brepols, 1999).
Guillelmus de Conchis, *Glosulae sup. Prisc.*	*Glosulae super Priscianum*, Florence, Biblioteca Laurenziana, San Marco 310 (*uersio prior*); Paris, Bibliothèque nationale, lat. 15130 (*uersio altera*).
Guillelmus de Conchis, *Guillelmi Glos. sup. Tim.*	Édouard Jeauneau, ed., *Guillelmi de Conchis Glosae super Platonem*, Corpus Christianorum. Continuatio Mediaevalis 203 (Turnhout: Brepols, 2006).
Guillelmus de Conchis, *Phil.*	PL 172, 39–102; corrected against Gregor Maurach, ed., *Wilhelm von Conches. Philosophia* (Pretoria: University of South Africa, 1980).
Ps.-Guillelmus de Conchis, *Moralium*	John Holmberg, ed., *Das Moralium dogma philosophorum des Guillaume de Conches* (Uppsala: Almqvist & Wiksell, 1929).
Hisdosus, *De anima mundi Platonica*	Paris, Bibliothèque nationale, lat. 8624, 17r–22r.
Honorius Augustodunensis, *Imago mundi*	Valerie Flint, "Honorius Augustodunensis. *Imago mundi*," *Archives d'histoire doctrinale et littéraire du Moyen Âge* 49 (1982), 7–153.
Hugo de S. Victore, *Did.*	Charles Henry Buttimer, ed., *Hugonis de Sancto Victore Didascalicon de studio legendi: A Critical Text*, Studies in Medieval and Renaissance Latin 10 (Washington, DC: Catholic University Press, 1939).
Iamblichus, *De comm. math. sc.*	Nicolaus Festa and Ulrich Klein, eds., *Iamblichi De communi mathematica scientia liber* (Stuttgart: Teubner, 1975).

Isaac de Stella, *Ep. de an.*	Caterina Tarlazzi, "L'*Epistola de anima* di Isacco di Stella: studio della tradizione ed edizione del testo," *Medioevo: Rivista di storia della filosofia medievale* 36 (2011), 167–278.
Isidorus, *Etym.*	W. M. Lindsay, ed., *Isidori Hispalensis Episcopi Etymologiarum siue Originum libri xx* (Oxford: Clarendon Press, 1911).
Macrobius, *In Som. Scip.*	James Willis, ed., *Ambrosii Theodosii Macrobii Commentarii in Somnium Scipionis*, Bibliotheca scriptorum Graecorum et Romanorum Teubneriana (Leipzig: B. G. Teubner, 1963).
Martianus, *De nuptiis*	James Willis, ed., *Martianus Capella, De nuptiis Philologiae et Mercurii*, Bibliotheca scriptorum Graecorum et Romanorum Teubneriana (Leipzig: B. G. Teubner, 1983).
Nemesius, *Prem. phys.*	Karl Burkhard, ed., *Nemesii episcopi Premnon physicon a N. Alfano archiepiscopo Salerni in Latinum translatus*, Bibliotheca scriptorum Graecorum et Romanorum Teubneriana (Leipzig: B. G. Teubner, 1917).
Nicomachus, *Harm.*	*Harmonicon enchiridion* in Karl von Jan, ed., *Musici scriptores graeci. Aristoteles, Euclides, Nicomachus, Bacchius, Gaudentius, Alypius, et melodiarum ueterum quidquid exstat* (Leipzig: B. G. Teubner, 1895), 235–265.
Nicomachus, *Intr. ar.*	Richard Hoche, ed., *Nicomachi Geraseni Pythagorei Introductionis arithmeticae libri duo*, Bibliotheca scriptorum Graecorum et Romanorum Teubneriana (Leipzig: B. G. Teubner, 1866).
Philoponus, *In de An.*	Michael Hayduck, ed., *Ioannis Philoponi in Aristotelis de anima libros commentaria*, Commentaria in Aristotelem Graeca 15 (Berlin: Reimer, 1897).
Plato, *Lach., Alc. 1, Crat., Theaet., Prot., Phaedo, Tim., Sym., Phaedrus, Leg., Rep.*	John Burnet, ed., *Platonis Opera*, Scriptorum classicorum bibliotheca Oxoniensis (Oxford: Clarendon Press, 1900–1907).
Porphyrius, *In Ptolemaei Harm.*	Ingemar Düring, *Porphyrios Kommentar zur Harmonielehre des Ptolemaios*, Göteborgs Högskolas Årsskrift 38 (Göteborg: Elanders Boktryckeri, 1932).

Proclus, *In Remp.*	Wilhelm Kroll, ed., *Procli Diadochi in Platonis Rem publicam commentarii*, 2 vols., Bibliotheca Scriptorum Graecorum et Romanorum Teubneriana (Leipzig: B. G. Teubner, 1899–1901).
Proclus, *In Tim.*	Ernst Diehls, ed., *Procli Diadochi in Platonis Timaeum commentaria*, 3 vols., Bibliotheca scriptorum Graecorum et Romanorum Teubneriana (Liepzig: B. G. Teubner, 1903–1906).
Ps.-Euclid, *Sec. can.*	André Barbera, *The Euclidean Division of the Canon: Greek and Latin Sources*, Greek and Latin Music Theory 8 (Lincoln: University of Nebraska Press, 1991), 114–184.
Ptolemaeus, *Harm.*	Ingemar Düring, *Die Harmonielehre des Klaudios Ptolemaios*, Göteborgs Högskolas Årsskrift 36 (Göteborg: Elanders Boktryckeri, 1930).
Theon Smyrnaeus, *Exp.*	Eduard Hiller, ed., *Theonis Smyrnaei philosophi Platonici Expositio rerum mathematicarum ad legendum Platonem utilium*, Bibliotheca scriptorum Graecorum et Romanorum Teubneriana (Leipzig: B. G. Teubner, 1878).

ABOUT THE COMPANION WEBSITE

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Oxford has created a website to accompany *Composing the World*. There readers will find downloadable English translations of the Latin texts edited in the Appendices (excerpts from William of Conches's *Glosulae de Magno Prisciano* and Hisdosus's *De anima mundi Platonica*).

Composing the World

Prelude

Listening to the Universe

Mundus diligit concordiam.
—William of Conches, *Glosae super Platonem*, 39

"We can hear the universe!" This was the triumphant proclamation at a February 2016 press conference announcing that the Laser Interferometer Gravity Observatory (LIGO) had detected a "transient gravitational-wave signal." What LIGO heard in the morning hours of September 14, 2015, was the "sound" of cosmic forces of mind-boggling power diffused through a cosmic medium of mind-boggling expansiveness.[1] Einstein's general theory of relativity predicted that when massive stellar bodies explode or collide, the very fabric of space-time would register the reverberations of the forces unleashed, and undulating vibrations of space-time—gravitational waves—would propagate through the fabric of the universe like ripples on the surface of a pond.[2] The signal detected by LIGO was a perceptible confirmation of Einstein's equations: the transient ripple of two black holes colliding more than a billion years ago, "their orbital inspiral and merger, and subsequent final black hole ringdown."[3] The event was unseen and in

[1] "Mind-boggling" was the term used to describe the event by David Reitze, executive director of the LIGO Laboratory, in the press conference announcing the detection: "That's what we saw here. It's mind-boggling," "LIGO detects gravitational waves—announcement at press conference (part 1)." YouTube video uploaded by the National Science Foundation, at 8:28, https://youtu.be/aEPIwEJmZyE (accessed March 24, 2016).

[2] See Marcia Bartusiak, *Einstein's Unfinished Symphony: Listening to the Sounds of Space-Time* (Washington, DC: Joseph Henry Press, 2000), who anticipated the musical response to the 2015 discovery: "Firm discovery of these waves will at last complete the final movement of Einstein's unfinished symphony" (9). The mathematical model of the black hole ringdown—as yet undetected when Bartusiak was writing—is discussed in a chapter entitled, "The Music of the Spheres" (188–206, with the black hole collision at 195–196).

[3] B. P. Abbott et al., "Observation of Gravitational Waves from a Binary Black Hole Merger," *Physical Review Letters* 116 0611202 (2016), 2.

fact otherwise entirely undetectable save by the minutely tuned interferometers located in Livingston, Louisiana, and Hanford, Washington. The interferometers deployed in the ongoing experiment are most sensitive to waves between one hundred and three hundred hertz, well within the range of human hearing, could our ears hear in the medium of gravity.[4] Scientists associated with the project describe the detection of the signal as an act of listening. "We can hear gravitation waves. We can hear the universe," LIGO Scientific Collaboration Spokeswoman Gabriela Gonzalez explained in the press conference. "That's one of the beautiful things about this," she continued. "We are not only going to be seeing the universe; we are going to be listening to it."[5] David Reitze, Executive Director of the LIGO Laboratory, used similar language: "Up until now we've been deaf to gravitational waves, but today we are able to hear them."[6] Columbia University astrophysicist Szabolcs Marka made the inevitable comparison to music: "Until this moment, we had our eyes on the sky and we couldn't hear the music. The skies will never be the same."[7]

The sound of gravitational waves immediately caught the public imagination. Various computer modelings, "recordings," and remixes circulated widely on the internet.[8] Brian Greene, a physicist from Columbia University, capitalized on the attention and, in an appearance on *The Late Show with Stephen Colbert* (on February 24, 2016), explained just what we hear when we "hear" gravitational waves:

GREENE: You can actually in some sense hear the gravitational waves; they vibrate at a frequency that, if you turn it into sound, the human ear can hear, and these sounds . . .

COLBERT [interrupting]: These waves can be turned into sound?

G: They can, and these are the most spectacular sounds from the standpoint of—they herald a revolution in our understanding of the universe.

C: Okay, so I understand you brought one of these sounds with you.

G: Yeah, yeah I did.

C: And this is the sound of what? What are we listening to?

G: This is the sound of two black holes colliding.

C: Actually? This is actually a computer rendering of the gravitational waves into sound.

[4] The recorded wave sweeps from 35 to 250 hertz.

[5] "LIGO detects gravitational waves," at 18:43.

[6] Ibid., at 10:54.

[7] Sandi Doughton, "Hearing the Music of the Universe: Hanford Helps Find Einstein's Gravitational Waves," *The Seattle Times* (February 11, 2016). http://www.seattletimes.com/seattle-news/science/scientists-including-hanford-team-confirm-einsteins-theory-of-gravitational-waves/ [accessed March 23, 2016].

[8] E.g., Arthur Jeffes, a London-based composer and producer, collaborated with astrophysicist Smaya Nissanke (Radboud University) to construct a "musical narrative . . . which both demonstrates the new data and responds to it artistically" (http://www.epcmusic.com/space).

G: This is a simulation, but the data agrees with the simulation . . .
C: And this is what it would sound like?
G: This is what it would sound like.
C: So, drum roll please. [Drum roll . . . a sound plays, which strikes the ears as an electric slide-whistle punctuated by a final blip. The audience laughs.]
C: Is God Bugs Bunny? What is that?
G: Big things come in little packages. Those sounds are really telling us things about the universe that we have no other way of discerning. Those kinds of sounds are the future of studying the cosmos.[9]

I want to highlight three aspects of this exchange that are directly related to the themes and arguments developed in this book. First, the human ability to hear the cosmos is predicated upon the transduction of an extrasonic signal—a signal that always exceeds or outstrips the physical, embodied limitations of the ear—into a sonic representation accommodated to human sensory realities. As Greene notes, we can "in some sense hear" gravitational waves, but only to the extent that the signal transmitted via the medium of gravity is transduced into a sonic signal that the ears can register. Put another way, only Pythagoras could hear the music of the spheres (and as Isaac Newton is reported to have claimed: "I thought Pythagoras's Musick of the spheres was intended to typify gravity").[10]

Second, these sounds are "spectacular" and "herald a revolution in our understanding of the universe." The import of these sounds is epistemological. The sounds qua spectacular (in the etymological sense of *spectaculum* as an act of seeing) allow us insight into the unseen and invisible forces of nature; as transduced sonic objects, they encode information about their sound producers and "[tell] us things about the universe that we have no other way of discerning." Put another way, to hear the cosmos is to experience the world through a cosmic acoustemology (acoustic epistemology) that privileges the experience of sound as a special kind of relational knowledge, a "knowing-with and knowing-through the audible."[11]

[9] "Gravitation Waves Hit the Late Show," 6:48–8:00, http://www.cbs.com/shows/the-late-show-with-stephen-colbert/video/F42ED0EC-2452-577E-F107-1614438B56F2/gravitational-waves-hit-the-late-show/ (accessed March 25, 2016). Dialogue courtesy of Late Show Inc.

[10] Peter Pesic, *Music and the Making of Modern Science* (Cambridge, MA: MIT Press, 2014), 131. The quotation is recorded by John Conduitt (husband of Newton's niece and co-resident with Newton at Cranbury) in notes gathered for a (never realized) life of Newton: Cambridge, King's College, Keynes MS 130.07, 5r. The continuation of this claim clarifies Newton's intention: "& as he makes the sounds & notes to depend on the size of the strings, so gravity depends on the density of matter." See J. E. McGuire and P. M. Rattansi, "Newton and the 'Pipes of Pan,'" *Notes and Records of the Royal Society of London* 21 (1966), 108–143; but also note the important corrective provided by Paolo Casini, "Newton: The Classical Scholia," *History of Science* 22 (1984), 1–58.

[11] Stephen Feld, "Acoustemology," in *Keywords in Sound*, ed. David Novak and Matt Sakakeeny (Durham and London: Duke University Press, 2015), 12.

Third, as the comedic force of Colbert's memorable punchline—"Is God Bugs Bunny?"—suggests, there is a fundamental disjunction between sound and source. The original sonic transduction of the (at the time of this writing) only gravitational wave recorded evokes the thump of a sampled bass drum, while a frequency-adjusted version, shifted by 400Hz to accommodate human hearing better, sounds more akin to the drip of a leaky faucet in the dead of night. The still more cleaned-up simulation that was played on *The Late Show*, which optimizes the "signal-to-noise ratio," sounds even more disconnected, its blippy, sliding chirp profoundly disproportionate to the gravity of its source—less an awe-inspiring, black-hole-collision-worthy sound and more a Bugs Bunny slapstick: "boooiiing." Just as extrasonic cosmic signals always outstrip our ability to hear them, so too our desire to actually hear such sounds always outstrips the monumentality of their sonic transduction. Put another way, the sounds of the cosmos are more likely to present themselves through the ping of hammers in a humble blacksmith's forge, as in the famous account of Pythagoras's discovery of music, than as the thunderous, unmediated sound of a divine maker.

These sounds (transduced, cosmo-acoustemological, and nonetheless comically disproportionate to their cosmic origin) may well be the future of studying the cosmos, as Brian Greene predicts. This book argues, however, that sound—and, in particular, the harmonious coordination of sounds, sources, and listeners—has always been an integral part of the *history* of studying the cosmos. It seeks to document the wagers that humanity has made on the knowledge of the world's composition, and our place within its harmonious aggregate, based on aurality—our ability to hear the world and ourselves in all of its and our harmonious particularities. *Composing the World* provides evidence for a series of related claims:

1. that this harmony is grounded in material interactions and intermaterial relations;[12]
2. that harmony can be the optimistic site of a "unified theory of cosmology," which can account for the many resonances between macrocosm and microcosm, soul and body, immaterial and material worlds, even between God and humanity;
3. that harmony serves not just as the foregrounded subject of discourse about the world but even as the unarticulated ground for thinking and theorizing the world at all;
4. and, finally, that the aesthetic and affective power of phenomenal harmony as sound can be deliberately and consciously exploited to explain and instill a sense of *cosmic* affect—the sense of wonder, love, and desire to *hear* the harmony of the world.

[12] I borrow the term "intermaterial" from Nina Sun Eidsheim, *Sensing Sound: Singing and Listening as Vibrational Practice* (Durham: Duke University Press, 2015).

It is my hope that these broad claims will resonate with a wide variety of readers in the fields of music studies, sound studies, medieval studies, and the history of (natural) philosophy and science. The specific historical terrain of my argument is more circumscribed, however; it focuses upon the music-theoretical, philosophical, and philological specificity of these broader claims in the world of twelfth-century music theory and philosophy. It offers a new intellectual history of the role of harmony in medieval cosmological discourse, focused primarily on the twelfth-century reception and development of ancient and late-ancient Platonism, as transmitted by Calcidius, Macrobius, Martianus Capella, and Boethius. Its central argument—which synthesizes material from domains usually treated separately, including philosophy, logic, cosmology, music theory, and literature—affirms music theory's foundational and often normative role within the development of medieval cosmological models, at both micro- and macrocosmic levels: the microcosmic harmonies that govern the moral, physical, and psychic equilibrium of the human and the macrocosmic harmonies that ensure cosmological perfection.

Historical Motivations: "Where are the writers on music?"

The renowned twelfth-century magister Thierry of Chartres tantalizingly promised that his hexameral commentary, the *Treatise on the Works of the Six Days* (*Tractatus de sex dierum operibus*), would offer four kinds of arguments (*probationes*) to bring his readers to knowledge of their creator: "the proofs of arithmetic and music, geometry and astronomy."[13] The *probatio musicalis*, however, remains an empty promise, for the extant *Tractatus* trails off, mid-argument, before even the first arithmetical proof has proved its point. Regrettably, the twelfth century is littered with such broken promises—teasing references to works that perhaps were never written, perhaps have slipped through the fickle fingers of Fortuna and are lost forever, or perhaps still lie undisturbed and undiscovered, maybe even in plain sight, just waiting for the right reader. Examples are numerous. A commentator on Martianus Capella's *On the Marriage of Philology and Mercury* begs off a serious discussion of the soul's "vital spirit" (*uitalis spiritus*) and directs the reader elsewhere: "Enough about the vital spirit, for we have pursued this subject in more detail in our commentary on the *Timaeus*."[14] The anonymous author of a now fragmentary commentary on Boethius's *Consolation of Philosophy* makes a similar promise in his quick remarks on *hyle* or primordial matter: "What *hyle* is will not be discussed here, but in (a commentary on) Plato's *Timaeus*."[15] Likewise,

[13] Nikolaus M. Häring, ed., *Commentaries on Boethius by Thierry of Chartres and His School* (Toronto: Pontifical Institute of Mediaeval Studies, 1971), *Tractatus de sex dierum operibus*, 56.

[14] *Comm. in Mart.* 8.1043–1044: Hec de uitali spiritu. Super Platonem enim hec latius executi sumus.

[15] Biblioteca Apostolica Vaticana, Codex Vaticanus latinus 919, 198va: Quid sit yle non hic dicetur, sed in Platonis Thimeo.

an unpublished twelfth-century commentator on Plato's *Timaeus*, distinguishable from that most prolific of medieval authors, Anonymus, only because he happens to tell us that his name is Hisdosus, proudly refers his readers to his own refutation of mathematicians who claim that a disjunct harmonic proportion is impossible, "whom we plainly refute in (a commentary on Boethius's) *Arithmetic*."[16] If any of these commentaries were completed, they have not yet been found. Each new discovery seems to create as many gaps as it fills—or, to borrow a metaphor from Boethius, with every uncertainty that we pare away, innumerable others, like Hydra-heads, spring up in its place (*Cons. phil.* 4.p6.3).

Our knowledge of the twelfth-century Platonic commentary tradition is thus necessarily imperfect, and as new texts come to light, our assessment of its terrain will continue to change and, we hope, improve. But despite the gaps (both known and unknown), the extant tradition still allows us to respond to an even more fundamental question posed, now upwards of forty years ago, by Lawrence Gushee. In his magisterial survey of medieval musical writings, Gushee famously called attention to an "extremely odd facet" of the twelfth century and posed the question bluntly: "Where are the writers on music?"[17]

Gushee is not alone in posing the question. It is a common belief that the twelfth century offers a meagre harvest in the field of music theory. Despite the remarkable effort expended upon the post-twelfth-century adoption, expansion, and critique of Aristotelian thought in musical discourse,[18] the period immediately preceding the full integration of Aristotelian vocabulary has not received as much attention. In part, this inattention stems from a perceived lack of texts; there are no "Neoplatonic" musical treatises from the twelfth century comparable in scope to the "Aristotelian" veneer of, say, the thirteenth-century *Ars musicae* of Magister Lambertus or the several fourteenth-century scholastic *Quaestiones de musica* that have figured prominently in recent scholarship.[19] But the apparent dearth of twelfth-century "writers on music" lamented by Gushee does not reflect the evidence of surviving texts; rather, it is a product of modern disciplinary

[16] Paris, Bibliothèque nationale, lat. 8624, 20r: quos in Arismetica euidentissime confutamus.

[17] Lawrence Gushee, "Questions of Genre in Medieval Treatises on Music," in *Gattungen der Musik in Einzeldarstellungen: Gedenkschrift Leo Schrade*, ed. Wulf Arlt, Ernst Lichtenhahn, and Hans Oesch (Munich: Francke Verlag, 1973), 410.

[18] See, for instance, Dorit Tanay, *Noting Music, Marking Culture: The Intellectual Context of Rhythmic Notation, 1250–1400*, Musicological Studies and Documents 46 ([s.l.]: American Institute of Musicology, 1999); Frank Hentschel, *Sinnlichkeit und Vernunft in der mittelalterlichen Musiktheorie: Strategien der Konsonanzwertung und der Gegenstand der musica sonora um 1300*, Beiheft zum Archiv für Musikwissenschaft 47 (Stuttgart: Franz Steiner Verlag, 2000).

[19] E.g., Cecilia Panti, "The First 'Questio' of ms Paris, B.N. lat. 7372: 'Utrum musica sit scientia,'" *Studi medievali* 33 (1992), 265–313; Frank Hentschel and Martin Pickavé, "'Quaestiones mathematicales': Eine Textgattung der Pariser Artistenfakultät in frühen 14. Jahrhundert," in *Nach der Verurteilung von 1277: Philosophie und Theologie an der Universität von Paris im letzten Viertel des 13. Jahrhunderts*, ed. Jan A. Aertsen, Kent Emery Jr., and Andreas Speer (Berlin: Walter de Gruyter, 2001), 618–634; Hentschel, *Sinnlichkeit und Vernunft*, 281–313.

divisions and musicological expectations. As a result of this inattention, some scholars have even gone so far as to claim that the twelfth century witnessed the near complete withdrawal of music from quadrivial studies. The new "autonomy" of music, confirmed for historian of science Guy Beaujouan by a detachment from generalized studies, led (Beaujouan claims) to the "eclipse" of Boethius: "Not until the fourteenth century, with the *ars nova*, did music once more become a specialization of masters of arts interested in mathematics. . . . [Then,] the *De musica* of Boethius was studied with renewed interest."[20]

As many modern histories would have it, musical treatises in the late eleventh and early twelfth centuries began to shy away from the mathematical and cosmological concerns that had bound music to the quadrivium.[21] Following a late-eleventh-century flurry of activity in South German monasteries, capped at the turn of the century by Johannes Affligemensis's *De musica*,[22] music-theoretical discourse seems to exhibit a decisive change in register. Save for the midcentury treatises clustered around Cistercian chant reform,[23] most twelfth-century writings on music (and there aren't all that many) share a common theme: codifying the rules and precepts of the quickly developing polyphonic practices. The rules set forth in *Ad organum faciendum* (*On composing organum*) in the early twelfth century or the so-called "Vatican Organum Treatise" (at least some of whose teachings stem from the late twelfth century), for instance, arose not from armchair speculation but from repeated and tested practical verification.[24] Although such organum tracts are not entirely devoid of philosophical interest, scholars are right to observe that testimony to a thriving tradition of speculative music theory they are not.

So where are the writers on music? Exploring this question and its implications for the history of music theory led Gushee to the doorstep of the so-called

[20] Guy Beaujouan, "The Transformation of the Quadrivium," in *Renaissance and Renewal in the Twelfth Century*, ed. Robert L. Benson and Giles Constable (Cambridge, MA: Harvard University Press, 1982), 467.

[21] Hans Heinrich Eggebrecht, "Die Mehrstimmigkeitslehre von ihren Anfängen bis zum 12. Jahrhundert," in *Die mittelalterliche Lehre von der Mehrstimmigkeit*, Geschichte der Musiktheorie 5 (Darmstadt: Wissenschaftliche Buchgesellschaft, 1984), 9–87; Sarah Fuller, "Early Polyphony," in *The New Oxford History of Music*, Vol. 2: *The Early Middle Ages to 1300*, 2nd ed., ed. Richard Crocker and David Hiley (Oxford: Oxford University Press, 1990), 485–556; in Guy Beaujouan's discussion of twelfth-century quadrivial studies, the section about music is entitled "The secession of music" ("The Transformation of the Quadrivium," 465–467).

[22] *Iohannes Affligemensis, De musica cum tonario*, ed. Joseph Smits van Waesberghe ([Rome]: American Institute of Musicology, 1950); English translation in *Hucbald, Guido, and John on Music: Three Medieval Treatises*, ed. Claude V. Palisca, trans. Warren Babb (New Haven and London: Yale University Press, 1978), 85–198.

[23] Claire Maître has re-edited the most important of these treatises, the *Regule de arte musica*, with a substantial discussion of its role in the reform; see *La réforme cistercienne du plain-chant: Étude d'un traité théorique* (Brecht: Commentarii Cistercienses, 1995).

[24] See, Eggebrecht, "Die Mehrstimmigkeitslehre," 86–87.

"School of Chartres," but he did not enter, warded off perhaps by its intimidating philosophical bent, noting that "while music's position in the liberal arts was strong [at Chartres], the texts used may rarely have had relevance to the practical concerns of standard plain-chant. The notorious (neo) Platonism of the intellectuals of Chartres must have something to do with this."[25] On one level Gushee was absolutely correct: the often speculative and generally non-practical deployment of music theory in the writings of many twelfth-century authors—especially, but not only, those commonly associated with the "School of Chartres"—had everything to do with the "notorious (neo) Platonism" that characterizes much (though certainly not all) of twelfth-century thought. But I must caution that if we neglect as extramusical or as somehow less relevant to musicology medieval musical writings that do not directly bear on the "practical concerns of standard plain-chant" (and Gushee is right that these twelfth-century authors have little to say on such matters), then we have done ourselves and the discipline of musicology a grand disservice. For although Bernard of Chartres, William of Conches, Thierry of Chartres, and the host of other commentators and thinkers who populate the pages to come may not—or at least not in any strong sense—be *musici* (roughly, "music theorists") in the same way that many were praised by their contemporaries as *philosophi* ("philosophers") and *grammatici* ("grammarians"), their thoughts on music can and do, as I will argue, offer us a window onto a world of musical speculation, and musical speculation on the world, that has been little mapped by musicologists, one that offers sometimes surprising correctives to the "standard history" of medieval music theory as viewed from the standpoint of the "technical tradition."

If my focus on twelfth-century traditions may come as a surprise for historians of music theory, it will not surprise intellectual historians. Since Charles Homer Haskins single-handedly turned the attention of generations of scholars to the "Renaissance of the twelfth century" in his 1927 book of the same title, this period has been pinpointed as the originary locus for various regulative concepts, including medieval humanism, as both a renewed study of Latin literary classics and a new emphasis on human dignity, virtue, and agency;[26] individual subjectivity and quasi-Foucauldian "technologies of the self," born of both an introspective turn toward the inner life and the outer textualization of the self (thought to be exemplified in Abelard's *Historia calamitatum*);[27] standardized educational structures and curricula, which pushed education beyond the traditional monastic schools and into cathedral schools, independent schools, and princely courts

[25] Gushee, "Questions of Genre," 423.

[26] R. W. Southern, *Medieval Humanism and Other Studies* (Oxford: Blackwell, 1970); *Scholastic Humanism and the Unification of Europe,* Vol. 1: *Foundations* (Oxford: Blackwell, 1995). Willemien Otten, *From Paradise to Paradigm: A Study of Twelfth-Century Humanism* (Leiden: Brill, 2004).

[27] Colin Morris, *The Discovery of the Individual 1050–1200* (New York: Harper, 1972); Bridget K. Balint, *Ordering Chaos: The Self and the Cosmos in Twelfth-Century Latin Prosimetrum* (Leiden: Brill, 2009);

across Europe;[28] and the (re)discovery of nature, no longer conceptualized as the simple manifestation of God's will but "as the object of a study aiming to know the *legitima causa et ratio* ["lawful cause and reason"] of every natural event."[29]

This last "innovation" is most immediately associated with a network of like-minded but fiercely independent scholars including Bernard of Chartres (a master and subsequently chancellor at the cathedral school at Chartres) and his students William of Conches and Thierry of Chartres (also chancellor at Chartres), as well as the English scholar Adelard of Bath (who studied at Tours and taught at Laon) and Bernard Silvestris (probably working at Tours), both of whom have literary and intellectual ties to Thierry: Adelard's mathematical translations were included in Thierry's *Heptateuchon* (a compilation of texts on the liberal arts), and Bernard dedicated his most successful work, the *Cosmographia*, to Thierry. Many of these scholars have, at one time or another, been associated with the so-called "School of Chartres," whose pride of place was first anchored by the 1895 doctoral thesis of the Chartrian scholar and canon, Alexandre Clerval;[30] thereafter, it quickly became "received wisdom" in the publications of Baeumker, Flatten, and Parent.[31] Richard Southern's repeated challenges to the reified conception of a "School of Chartres" (as either historical reality or intellectual disposition) has rightly introduced a more sober, cautionary tone, and the basic point of Southern's criticism remains valid—that medieval scholars narrowly associated with Chartres deserve consideration as part of a broader scholastic context.[32] Indeed they do, and this book is part of that project.[33] Nevertheless, against Southern's arguments, Édouard Jeauneau has defended the importance of Chartres,[34] and following his

Caroline Walker Bynum, "Did the Twelfth Century Discover the Individual?" *Journal of Ecclesiastical History* 31 (1980), 1–17.

[28] C. Stephen Jaeger, *The Envy of Angels: Cathedral Schools and Social Ideals in Medieval Europe, 950–1200* (Philadelphia: University of Pennsylvania Press, 1994); Stephen Ferruolo, *The Origins of the University: The Schools of Paris and Their Critics, 1100–1215* (Stanford: Stanford University Press, 1985).

[29] Tullio Gregory, "La nouvelle idée de nature et de savoir scientifique au XIIe siècle," in *The Cultural Context of Medieval Learning*, ed. J. E. Murdoch and E. D. Sylla (Dordrecht and Boston: D. Reidel, 1975), 195–196. Andreas Speer, *Die entdeckte Natur: Untersuchungen zu Begründungsversuchen einer 'scientia naturalis' im 12. Jahrhundert* (Leiden: Brill, 1995).

[30] Alexandre Clerval, *Les écoles de Chartres au Moyen Âge* (Paris: A. Picard et fils, 1895).

[31] Clemens Baeumker, *Der Platonismus im Mittelalter* (Munich: Verlag der K. B. Akademie der Wissenschaften, 1916); Heinrich Flatten, *Die Philosophie des Wilhelms von Conches* (Koblenz: Görres-Druckerei, 1929); Joseph-Marie Parent, *La doctrine de la création dans l'École de Chartres* (Paris: J. Vrin, 1938).

[32] Southern, *Medieval Humanism*, 61–85; *Platonism, Scholastic Method and the School of Chartres, The Stenton Lecture 1978* (Reading: University of Reading Press, 1979).

[33] Hence, following Winthrop Wetherbee's lead ("Philosophy, Cosmology, and the Twelfth-Century Renaissance," in *A History of Twelfth-Century Western Philosophy*, ed. P. Dronke [Cambridge: Cambridge University Press, 1988], 21–53), I will collectively refer to masters such as Adelard of Bath, Bernard and Thierry of Chartres, William of Conches, and Bernard Silvestris as "cosmologists," not "Chartrians."

[34] See, for instance, Jeauneau, *Rethinking the School of Chartres*, trans. Claude Paul Desmarais (Toronto: University of Toronto Press, 2009).

lead Winthrop Wetherbee maintains that there remain "important and widely influential common elements in the thought of those masters whose names have been most frequently associated with Chartres."[35] Most characteristic of these commonalities are, first and foremost, (1) an avowed sympathy for Platonism, specifically the *Timaeus* in Calcidius's incomplete translation (through 53c), (2) the promotion of reason over authority, and (3) a conception of nature as the (proximate) efficient cause of material creation.

The twelfth-century cosmologists who are the primary subject of this book—that is, scholars interested in nature and natural processes—developed and articulated their doctrines in dialogue with Platonic texts, primarily by way of commentary on Plato's *Timaeus* (via Calcidius's fourth-century Latin translation and commentary), Macrobius's *Commentary on the Dream of Scipio* (beginning of the fifth century), Martianus Capella's *On the Marriage of Philology and Mercury* from the late fifth century, and three primary works in Boethius's oeuvre, the *Fundamentals of Arithmetic,* the *Fundamentals of Music,* and the *Consolation of Philosophy* (all from the first few decades of the sixth century). These were the four late-ancient authors who offered related yet distinct points of entry into a single, overarching fascination with the secrets of nature. Modern scholarship has generally examined these commentary traditions individually on a diachronic axis. While this sort of inquiry usefully highlights the seams and joints in the reception history of the textual traditions singly, it nevertheless obscures the profoundly synchronic relationship among these four texts in the twelfth century. The works of Plato and his late-ancient proponents were not approached as autonomous, self-contained tracts; rather, they were seen to complement each other in fundamental ways. The *Timaeus* and Calcidius's commentary provided a basic cosmological framework and the three metaphysical principles, God, Ideas (or Exemplars), and the "Receptacle," which was conflated with Aristotelian prime matter (*hyle* or, in Latin, *silva*); Macrobius equipped them with a hermeneutic model of fictitious but heuristic fables and allegories through which they could harmonize classical myth and philosophy with Christian theology; Martianus afforded a sweeping allegorical structure for such an inquiry; and, finally, Boethius showed the way along the fourfold mathematical path (the quadrivium) that led to the proper end, the ascent to "the Good" (the *summum bonum*), which was the final cause of all cosmological inquiry: the ascent through creatures to the creator (*per creaturas ad creatorem*).

Not only did these late-antique texts themselves model this ascent; the very disciplinary structure of the music-theoretical tradition they transmitted provided an often explicit "methodology" for thinking through and listening to the interconnected stages of this ascent. The second part of this monograph (Chapters 3 through 5) attempts to exemplify and mobilize the intricate scheme of cross-cosmic correspondences that animate the medieval cosmos and its inhabitants

[35] "Philosophy, Cosmology, and the Twelfth-Century Renaissance," 21.

(human and nonhuman). These chapters collectively trace this material, intellectual, and anagogic ascent *per creaturas ad creatorem* in the same musical terms employed by the twelfth-century cosmologists: from the microcosmic harmonies of the *human* (Chapter 3), via the material harmonies of sonorous *instruments and voices* (Chapter 4), to the macrocosmic harmonies of the *universe* (Chapter 5). Readers with even a passing familiarity with the history of music theory will recognize this anagogic trajectory as roughly corresponding to Boethius's influential tripartition of music into *musica instrumentalis, musica humana,* and *musica mundana*, set forth in the prooemium to his *Fundamentals of Music*.[36] Cosmic music (*musica mundana*) arises from the harmonic structures and periods of the celestial bodies, from the delicate balance of the four elements, and from the cyclical succession of the seasons;[37] human music (*musica humana*) comprises the harmonic structures governing the human soul, the human body, and the relations between soul and body;[38] and instrumental music (*musica instrumentalis*) encompasses the sonorous sounds arising from instruments and voices, which are the servants of song.[39] Each level is an analogue of the others (at the material, anthropological, or cosmic level, mutatis mutandis), and collectively they actualize the continuous proportionality that ensures the continuity and integrity of the worldly machine (*machina mundi*).

Contemporary Motivations: The Afterlives of a Dead Metaphor

One of my secondary aims is to bring the less familiar discourse of medieval musical cosmology to the attention of scholars working in more familiar areas of musical and philosophical inquiry, medieval and modern. What might it mean to situate and reassess the harmonic and semiotic perspectives of medieval cosmology in the context of recent developments in biosemiotics and critical theory, in particular the *Umwelt* theory of Jakob von Uexküll (1864–1944), an early-twentieth-century theoretical biologist, whose work has been taken up by such recent theorists as Maurice Merleau-Ponty, Gilles Deleuze, and Félix Guattari?[40]

[36] *Inst. mus.* 1.2 (187.18–23): Principio igitur de musica disserenti illud interim dicendum uidetur, quot musicae genera ab eius studiosis conprehensa esse nouerimus. Sunt autem tria. Et prima quidem mundana est, secunda uero humana, tertia, quae in quibusdam constituta est instrumentis, ut in cithara uel tibiis ceterisque, quae cantilenae famulantur. Since a full explication of this division and its influence on subsequent music-theoretical and philosophical traditions forms the heart of this study, I here sketch only a brief outline of the division.

[37] *Inst. mus.* 1.2 (187.23–188.26).

[38] *Inst. mus.* 1.2 (188.26–189.5).

[39] *Inst. mus.* 1.2 (189.5–12).

[40] Brett Buchanan, *Onto-Ethologies: The Animal Environments of Uexküll, Heidegger, Merleau-Ponty, and Deleuze* (Albany: SUNY Press, 2008).

To be clear, I do not encourage the construction of concrete genealogical connections between the harmonicizing traditions of medieval Platonism and Deleuze and Guattari's "cosmic refrain of the sound machine,"[41] nor the anachronistic collapse of semantic differences between, say, Badiou's famous declaration that "mathematics = ontology"[42] and Thierry of Chartres's claim that "the creation of numbers is the creation of reality" (*creatio numerorum rerum est creatio*).[43] Instead, by framing the medieval in light of the modern, if only briefly in this prologue and again in the postlude, I seek to help us better hear the sympathetic resonances that emanate from both sides of such a juxtaposition; these resonances, in turn, can attune our ears to both the strikingly "modern" (if decidedly unmodish) concerns of medieval intellectuals and the hidden "intellectual medievalisms" embedded within the condition and critique of modernity itself. Although the central chapters of this book are unabashedly and unapologetically historical in focus, the broader impetus for the project (and, I hope, its utility) gains force from a more contemporary set of concerns that have shaped the current trajectory of humanistic disciplines, music studies included. The continued and indeed resurgent recourse to musical metaphors, analogies, and expressive modalities in contemporary philosophy, especially after the so-called "speculative turn" and its return to an overturned Platonism,[44] makes a more robust account, *on its own terms*, of the premodern but postclassical history of such modalities all the more pressing. We cannot think the present without understanding the past.

In the early twentieth century, Jakob von Uexküll revived the long-dormant music of the spheres. From the distant echoes of its ancient harmonies, Uexküll constructed what he called a *Kompositionslehre der Natur* ("composition theory of nature"), to which my title obliquely alludes. In a series of monographs spread across the first half of the twentieth century—including *Umwelt und Innenwelt der Tiere* (1909), *Theoretische Biologie* (1920), and *Bedeutungslehre* (1940)—Uexküll attempted to situate humankind within a broader, biologically and materially constituted semiotic nexus that encompasses the human and the nonhuman, the organic and inorganic, whose *harmonic* interrelations Uexküll deemed the "musical laws of nature" or a "theory of the music of life." Uexküll explicitly frames his semiotic project as an antimodern (specifically anti-Darwinian) critique of a mechanistic objectivism that would reduce the living organism to a functionalist "physico-chemical machine."[45] Uexküll's universe, much to the contrary, is perceptually alive, its semiotic web woven from a "functional cycle" (*Funktionskreis*)

[41] Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), 349.

[42] Alain Badiou, *Being and Event*, trans. Oliver Feltham (London: Continuum, 2005), 6.

[43] Nikolaus M. Häring ed. *Commentaries on Boethius*, 570.

[44] Iain Hamilton Grant, *Philosophies of Nature After Schelling* (London: Continuum, 2006), 6–14.

[45] Jakob von Uexküll, *Theoretische Biologie* (Berlin: Verlag von Gebrüder Paetel, 1920), xiii.