

Koechlin the Astronomer

How Popular Astronomy Inspired the French Avant-Garde

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Abstract

In this paper, I posit that there is a meaningful connection between the growth of popular astronomy in Parisian culture and a new focus on *astronomically-inspired* music (instead of *astrological*) by Charles Koechlin. Specifically, I present a brief history of popular astronomy in European culture from the mid-19th century through the early 20th century, followed by a biographical portrait of Koechlin (demonstrating his intimate connection with astronomy), and conclude with an analysis of Koechlin's orchestral work *Vers la Voûte étoilée*. In this analysis, I use Vogl's philosophical constructions of the telescope as a unique and self-referential form of media to present a reading of *Vers la Voûte étoilée* as a three-part portrait of the astronomer Camille Flammarion (the work's dedicatee), with each musical section corresponding to the three aspects of the telescope: the viewed object, the viewer, and the telescope itself.

Section I – Astronomy at the Turn of the 20th Century

"The period from roughly 1860 to 1910 was one of profound transformation for the scenes of the observatory, one that also included the emergence of astrophysics and the establishment of a great number of popular observatories and Uranias [a scientific society aimed at communicating science to the broader public]. Popular astronomy can be conceived of as a matrix from which a number of specialized constituencies progressively emerged in the period: astrophysicists, science popularizers, and amateur astronomers." (C. Bigg 2010, 307) It is in this environment that the French musical avant-garde comes of age. The composer Charles Koechlin (1867-1950) – among many others – was exposed to this rapid, rabid hunger for the "new astronomy" – the astronomy of spectroscopy (using prisms to separate the light coming from stars into its constituent frequencies and using these to determine the chemical composition of the stars), much more powerful and accurate telescopes (due to vast improvements in the manufacturing of glass), and astronomical photography (with photos of the planets Jupiter and Saturn dating from as early as 1879 and 1885, respectively). (Clerke 1902) The extent to

which astrophysics as an overtone contributed to the timbre of the bourgeois classes in Europe and the United States during the turn of the 20th century is significant, with public telescopes, observatories, and Uranias appearing in nearly every major city in the western world. The Berlin Urania, established in 1888, had as its aim “the dissemination of the enjoyment of the understanding of nature.” (C. Bigg 2010, 310) By 1910, there were at least three major, *popular* observatories in Paris, including the Observatoire Populaire du Trocadéro (founded in 1881 by Léon Jaubert), the observatory in Juvisy-sur-Orge (founded in 1883 by Camille Flammarion), and the Société Astronomique de France’s observatory. These observatories were “...situated in the city center, open to the public, and available to society figures for parties and receptions as well as to visits from schoolchildren, workers’ unions, and teachers...” (C. Bigg 2010, 312) These popular observatories went beyond simply supplying a telescope and a skilled operator for public exploitation – they were (similar to today’s magnificent science museums) places of highly curated experiences. Biggs explains that “the structure of popular observatories reflected their diverse origins and ambitions. They were hybrid spaces combining the museum, the observatory, the laboratory, and the *theater* [emphasis mine].” (313)

The fact that these public-facing facilities of scientific interest grew evermore distant from the cutting-edge of scientific research meant little to the populace who frequented these institutions for general star- or planet-gazing and for specific celestial events (e.g. eclipses, planetary transits of the sun, etc.). As astronomy became astrophysics – due to the continual and high-level research of the ‘real’ astronomers in the ‘real’ observatories not open to the public – popular astrophysics became interested in coloring its own understanding with fields as diverse as Egyptology and archaeology. This diversification of astronomical interest led to a variety of spectacle-oriented projects, from theatrical performances to a massive hall that projected images from a large telescope at the 1900 Universal Exposition. The “Spectacle of the Sky” became an integral part of the entertainment scene in Europe by the mid-19th century, and the specific theatricalization of astronomy was a significant part of this

spectacle. Popularizing Astronomers would tour with theatrical shows such as Louis Figuier's Théâtre Scientifique project and M. W. Meyer's fully-staged *From the Earth to the Moon* at the Berlin Urania meant to "exercise a stimulating influence on even the simplest mind, especially on the growing youth." More generally, too, these theatrical science lectures also led to impressive innovation in projection technology, lighting the way (as it were) for the myriad of fantastical theatrical innovations of the early 20th century. (C. Bigg 2010)

The great French compositional predecessors and pedagogues of the early 20th century Parisian compositional circle – Camille Saint-Saëns and Jules Massenet – were known to be keen amateur astronomers. Saint-Saëns owned an expensive refracting telescope which he bought after many years of enthusiastic public viewings (from the age of 24) of the stars via the street astronomers of late-19th century Paris. David Aubin notes in *The Moon for a Twopence* that Saint-Saëns wrote to the journal *L'Astronomie* in 1911;

"Nocturnal Paris, at this time, was not inundated with light as it is now, and stars could be seen rather well. On the place Vendôme, on the place de la Concorde, on the Pont-Neuf, men displayed large refracting telescopes where one was able, for two *sous*, to put his eye and see under a strong magnification the main curiosities of the firmament. Such were our observatories, when the Parisian sky, so often troubled by the mist rising from the Seine, allowed it." (Aubin, *The Moon* 2017)

And similarly, Jules Massenet was "also extremely interested in Astronomy, and made frequent observations with his telescope when residing at his country house, the Château d'Egreville." (Parr 1913)

As the twentieth century unfolded, the content of the spectacles changed, but the public's interest in them remained. This is impart because developments in optical glass manufacturing allowed the masses to safely view solar eclipses, and in the first half of the 20th century, there were seven partial

or total eclipses over mainland Europe in 1902, 1905, 1912 (where the path of totality passed through Paris), 1914, 1917, 1920, and 1945. (Aubin, *The Moon* 2017) (Contributors 2018) It is hard to imagine these events – especially the eclipse of 1912 – not deeply stirring the souls of the general populace, and especially of the amateur astronomers who took to the field with such passion.

In the same way that the music of the early 20th century is generally concerned with shedding the powerfully emotive, potentially suffocatingly narrow styles of the Romantic era, so too did the passion for astronomy metamorphose from a truly Romantic endeavor into a more objective, mathematical, and – to a certain degree –simplistic experience of ‘entertainment.’ Aubin reports that Chevalier Albert Hennet’s (1758–1828) ‘course on contemplative astronomy’ from 1820 made clear the Romantic ideals at the core of stargazing: “You who have been struck to grief, turn your eyes to the sky; up there, everything is beautiful, wise, peaceful; everything is admirable.” (Aubin, *The Moon* 2017) A century later, the project of popular astronomy was preoccupied with lifting the veil on Einstein’s General Theory of Relativity (from 1915), especially after Arthur Eddington’s 1919 solar eclipse observations that confirmed Einstein’s theory (by measuring light bending around the sun), leading to Einstein’s overnight worldwide fame.¹ Extending this mapping of romantic astronomy into the precision and difficulty of post-Einstein astrophysics onto musical history, a reasonable approximation for the threnody of Western Classical Music comes forth: the romantic ideals of early 19th century music transform into a myriad of aesthetics all tasked with examining in a fundamentally *new*, and perhaps more objective, entertainment-oriented way, the human experience.

¹ An aside to why this was such a spectacular moment in the history of science, and why Einstein became so immediately famous... Newton’s theory of gravity from 1686 *also* predicts the bending of light around massive objects (e.g. the sun), yet the value of ‘bending’ is double in Einstein’s theory. So, at the confirmation of this doubly-bent light, not only was Einstein’s incredibly vast and challenging theory supported by experimental evidence, but it simultaneously dethroned Newton’s theory – which had stood uncontested for over 200 years. The entire world’s scientific understanding of the universe was mediated through Newton’s laws, and suddenly, overnight, these laws were found to be, at best, limited approximations of a much deeper, more beautiful, and fundamentally more philosophically challenging theory of the universe. Indeed, the implications of relativity are myriad – from the universe being no longer causally closed to the existence of black holes (‘discovered’ by solving Einstein’s equations in 1915 by Karl Schwarzschild).

Section II – Charles Koechlin through the Telescope

Charles Koechlin was born in 1867 in Paris to a wealthy family of industrialists who exposed him to musical training in only superficial ways. Instead, his family planned for him to pursue a career in the military after studying engineering. This is not to say that his upbringing was particularly harsh – his father and grandfather were both successful capitalists, *but* also keen philanthropists interested in the well-being of their workers. Additionally, he inherited from them an “Alsatian temperament: a blend of energy, naivety, and an absolute, simple sincerity that lies at the heart of his music and character.” (Orledge, *Koechlin Life/Works* 1989, 3) It is in this framework that Koechlin becomes a composer, an amateur astronomer, a theorist, a critic, a communist, and – ultimately – a neglected composer of immense invention, taste, and production.

His uncle, the author and philosopher Charles Dollfus reportedly inspired in Koechlin “feelings for the night, the cosmos and the infinite” from an early age – feelings later realized in a number of Koechlin’s works.(4) In 1885 he took the entrance exams for the Naval Academy, but failed a portion of them and instead began preparing to attend the École Polytechnique. In 1887 he entered the École Polytechnique planning to study mathematics and philosophy, but his studies were interrupted twice by illness (ultimately diagnosed as tuberculosis). His illness forced him to into treatment in Algeria, where he continued to study music and became a passionate photographer. During his second year at the École Polytechnique, he again fell ill and ultimately finished a year behind and ranked 125th in his class. During this year, again convalescing in Algeria, he began to study harmony and developed his “need” to compose. It is at this time, too, that his early ambition to study astronomy and become a professional astronomer also ended. (Orledge, *Koechlin Life/Works* 1989)

His compositional training began first with private studies with the composer Charles Lefebvre in 1890, followed by stints auditing (because he was too old to attend as a student) classes in composition

by Antoine Taudou (1890) and Massenet (1892) at the Paris Conservatoire. In 1892, he also studied fugue with André Gedalge and music history with Louis Bourgault-Ducoudray – with both courses making a lasting impact on Koechlin’s musical style and interests. He began studying with Fauré, whose music he had adored for over a decade, in 1896 at the conservatoire and Koechlin quickly became a very highly regarded student. Within two years, Koechlin was covering the teaching duties of Fauré (including teaching Ravel, Roger-Ducasse, and Enesco counterpoint), as well as orchestrating some of Fauré’s music. In general, Koechlin had a thorough, traditional (albeit late-in-coming) musical training, where he developed long-term relationships with composers (such as Ravel and Fauré), and was able to more clearly articulate his unique voice through finely-tuned craft. On his own account, his evolution as a composer is roughly genre-based, going: “Choral works, songs, symphonic poems, chamber music, then chorales, fugues and other pedagogical exercises.” (Orledge, Koechlin Life/Works 1989, 10) Koechlin’s stylistic evolution is equally varied, moving (not necessarily in a linear fashion) from impressionism to polytonalism to monody and even early steps into electronic music (via the ondes martenot). Robert Orledge, Koechlin’s champion-scholar notes in summary of his whole musical essence:

“Thus he royally believed in the divine right of his own inspiration, choosing to remain free and write whatever he chose, whenever he chose, whenever he could, without concessions. His music remained young as he grew old, and neither he nor his friend Erik Satie saw it as in any way odd that they should form the nucleus of a group called *Les nouveaux jeunes* [The new young people] in 1918 when Koechlin was 51 and Satie a year older. That the project in its original form fell through, surrendering its potential limelight to *Les six* and the so-called *École d’Arcueil* (all pupils of Koechlin) in the early 1920s, was typical of Koechlin’s career, which he later described as ‘a succession of *happy chances* in the midst of *misfortune*.’” (Orledge, Koechlin Life/Works 1989, 2)

Koechlin's attraction to astronomy is not always a primary marker in his musical output, as his arguably most famous work is a massive symphonic cycle, composed at various stages in his career, based on Rudyard Kipling's *The Jungle Book*. Yet, there exists at least nine significant works by Charles Koechlin with fairly direct astronomical connections:

- ☞ *L'épopée de l'École Polytechnique* (text by Armand Silvestre) for reciter and orchestra in eight parts (Op. 2, 1894)
- ☞ *La lampe du ciel* (text by Leconte de Lisle) cantata for SATB soloists, female choir, and orchestra (Op. 12, 1896)
- ☞ *En mer, la nuit* for orchestra (based on Heine's *La mer du nord*, Op. 27, 1904)
- ☞ *Nuit de Wapurgis classique* for orchestra (based on Verlain's *Poèmes Saturniens*, Op. 38, 1916)
- ☞ *La chute des étoiles* (text by Leconte de Lisle) for female choir and piano (Op. 40, 1909)
- ☞ *Nuit de juin* for orchestra (used as the *Hymne à la nuit* in the *Symphonie d'hymnes* in 1936, Op. 48, 1916)
- ☞ *Choral fugue, en ut* for orchestra (used as the *Hymne au soleil* in the *Symphonie d'hymnes* in 1936, Op. 127, 1933)
- ☞ *Vers la Voûte étoilée* for orchestra dedicated to Camille Flammarion (based on the Nocturne in Eb minor for piano, Op. 129, 1933,)
- ☞ *Vers le soleil* for ondes martenot (Op. 174, 1939)
- ☞ *Le Docteur Fabricius* for orchestra (inspired by the Dollfus novel, Op. 202, 1944)

None of these works (except *Vers le soleil*) have published scores, although according to Orledge, "most manuscript scores...are available for hire with accompanying sets of instrumental parts." (Orledge, Koechlin Life/Works 1989, 327) Accordingly, recordings for all but *La chute des étoiles* exist (of varying qualities), forcing any analysis of these works into an aural realm.

Section III – An Analysis of Koechlin's *Vers la Voûte étoilée*

Of particular interest is the orchestral nocturne, *Vers la Voûte étoilée* (Op. 129), which was written between 1923 and 1933, orchestrated in September of 1933, and revised significantly in 1939.

This work is dedicated to Camille Flammarion, the popular French astronomer whose books on astronomy – one can speculate – were found on Koechlin’s bookshelf. Flammarion spoke in lyrical, romantic terms on his passion for astronomy, writing in *Astronomie populaire*: “I want to know each star by its name, I want, when the sky shines with all its light, to be able to spell out these celestial hieroglyphs and to guess what mysteries operate up there; I want to know everything that is known about these distant lights analyzed today using the chemistry of the heavens, to know their physical constitution, their worth, their power, and to appreciate the different richness of each constellation.” He goes even more hyperbolically: “What splendors to behold, what riches to acquire! What pleasure to experience! What delicious hours to spend, telescope in hand, like true astronomers...” (C. Bigg 2010, 314) Of course, techniques to ‘sonify the cosmos’ that were developed by Xenakis and others came later, but it is reasonable to believe that in Koechlin’s own, unique musical voice, he achieves a true-to-nature sounding of *these* – Camille Flammarion’s – astronomical ideals.

The musical material of this piece comes from a piano Nocturne in Eb minor, which was similarly worked on for a decade between 1922 and 1932, though never completed. Orledge notes how unusual it is that Koechlin made significant revisions to Op. 129, almost entirely consisting of cuts (including removing 10 consecutive pages from the manuscript score). Koechlin himself remarked of the work, when presenting it to Désormière (the conductor of the Orchestre Symphonique de Paris) in 1933, “[it is an] *introverted* work (although it grows much more sonorous towards the end). It will be judged (like my *Ballade* [Op. 50]) as grey, tedious, long etc... but despite that, if you see the opportunity to conduct it someday, I should be delighted. But perhaps it would need a favorably disposed public, or to be played in the *middle* of a Festival of works.” (Orledge, Koechlin Life/Works 1989, 151-52) Koechlin, probably due to his own tepid estimation, never heard this piece in his lifetime.

Koechlin generally moved freely through musical ideas as they relate to specific extra-musical ideas (e.g. a piece about the night generally has no presumptive qualities based on other pieces about the night). (Orledge, Koechlin Life/Works 1989, 302) However, his musical lexicon rarely stands in direct opposition to a topic-flavored collection of associations. *Vers la Voûte étoilée* does indeed *do* things one might expect of a nocturnal piece dedicated to an astronomer. As the score is unavailable, an aural-based, sensorial analysis is found in Table 1.

In this analysis, the sections are divided up not on harmonic grounds – as the harmonic language of this work is an overwhelmingly post-Romantic, non-functioning tonality – but instead on textural and melodic considerations. The opening third of the piece, sections **A1** and **A2**, is very thematically monolithic. Koechlin was well-regarded as a fine melody composer, with a significant amount of his output consisting of monodies. (Sauguet 1975) Accordingly, the fact that the first major section of the piece, topically referential to a kind of “primordial nature” (e.g. *Rheingold*, *La mer*, etc.) is built entirely from a single melody strung together through crafty orchestration. The textural accompaniment in this section mixes undulating and arpeggiating strings and woodwinds with sustained chords in the horns and trombones. This base-layer is seasoned with percussion (bass drum and timpani) and harp, while the melody floats along a nearly endless line of violins, flutes, and clarinets. The only reason this first major section is divided between **A1** and **A2** is that there is significant waves of crescendo and decrescendo that begin to oscillate in section **A2**. Otherwise, the musical content is essentially identical.

The second major section (between the two double-horizontal lines), consisting of thematic sections **B1**, **A1**, and **A3** immediately sets itself aside from the opening. The harmonic language becomes markedly more tonal; with cadential 6/4 chords rounding-off the two lyrical phrases of section **B1**. The texture of the accompaniment also changes, becoming more homophonic, less ‘busy’ in the strings, and more harmonically stable (e.g. clearer chord-voicing). At the end of the second phrase of **B1** (a full forty

An Aural-Based Sensorial Analysis of <i>Vers la Voûte étoilée</i> (Op. 129)			
Time	Comment	Section	Topic
0:00	Gentle, rocking opening, with a meandering melody (high register), with a very low bass pedal	A1	Primordial nature
0:50	Second statement of the melody, texture a bit richer		
1:07	Texture thins		
1:22	Modal cadence, elides into meandering post-cadence		
1:50	Melody moves lower, starts trading with bassoon and violas		
2:08	Transitioned into new section	A2	
2:30	Almost a rich moment, but with constraint		
3:05	Elision into phrase with a growing cresc		
3:22	Crests a hill - still meandering though		
4:00	Craftily deceived cadence		
4:12	Energy begins to build suddenly		
4:22	Climax of build, quickly fades		
4:47	Second climax, quickly fades		
5:12	Arrival at a new section, sentimental melody	B1	
5:31	Half cadence! Much more tonal as a section, <i>a la</i> a chorale		
5:50	Meandering returns from residue of second chorale cadence	A1	Primordial nature
6:18	Cadence into material from the first section, meandering horn melody		
7:01	Horn trades to piccolo and trumpet		
7:25	Tremolo texture emerges, intensity builds	A3	Turmoil, anxiety
7:50	High-range music suddenly buttressed from below		
8:00	Major build towards a more sonorous chorale section		
8:20	Liberated' sounding chorale, rich, moving strings	B2	Heroic journey
9:04	The harmonic 'balloon' pops, major build dims, to begin again in strings		Contemplation
9:27	Second balloon popping, builds again via woodwinds and brass		Resolute, wisdom
10:09	Builds to a new cresc, really starting to grow		
10:35	Dominant preparation, sounds inevitable		Glory, grandeur
10:45	The pedal becomes tonic, brass calls over rich texture		
11:07	Thematic statements passing around, harmony becomes more complex		
11:15	Polytonal harmony emerges in woodwinds, meandering in strings	A4	Primordial nature
11:35	Texture thins dramatically		
11:47	Final strike, everything now floating over a wide-range, thin harmony		
12:23	Unresolved conclusion of the thin harmony, left lingering.		

Table 1 - Aural-based Sensorial Analysis of Koechlin's Op. 129. Timings based on the Radio-Sinfonieorchester Stuttgart des SWR recording, released 2017 on the album "Koechlin: Orchestral Works."

seconds after the section opens – *everything* in this piece is lugubrious and patient), the cadence hangs in a more-than-unresolved way. Instead of closing to a dominant chord and then moving on as one might expect in a normal half-cadence, Koechlin slowly moves from the cadential 6/4 chord into the dominant, with each voice resolving at its own time. Before the music has fully arrived in the dominant chord, the meandering melody from the opening emerges, taking with it any sense of harmonic stability. The melody sounding in the horn this time suggests a topical association with a “heroic journey,” although this association being juxtaposed with the stronger “primordial nature” music that has inundated the listener for nearly five minutes significantly challenges the “hero’s” identity.

The third major section begins (at **B3**) with the “hero’s” music coming squarely to the fore in a robust, *tutti* chorale. This music builds in textural and dynamic intensity, accruing harmonic tension along the way, until it finally ‘pops’ and the texture thins out immediately. This ‘popping’ of the harmonic intensity does not correlate with a resolution of the harmonic tension – instead the harmonic tension is simply forgotten in the new, suddenly juxtaposed music. This process repeats within the context of the new, thinner texture consisting of strings, woodwinds, and some support from the horns. The meandering melody laces through the texture more clearly, while the harmonic tension is rebuilt. The second popping of this tension immediately produces an even thinner texture, the most gossamer thus far. The building of harmonic and textural tension continues after the second pop for a longer period, producing a sense of inevitability in the music – a climax is coming. The arrival of the climax is not sudden, nor necessarily ‘satisfying’ in a harmonic sense. The music peaks in dynamic, while the texture becomes brass-heavy, rich, and glorious. What served as a dominant pedal in the buildup becomes the tonic without moving, through the sheer force of compositional will. The thematic content here is passed around in single-bar incipits, each motive imitating a previous with the resultant texture producing a kind of hocket-esque chorale. As if composed to simulate a reverberant performance space, each motivic statement in this section leaves a harmonic residue behind, and the harmony becomes

denser and denser, leading to a complete divergence of tonal centers. A sustained polytonal chord sounds in a thinning texture signaling a return to the 'A' material, **A4**. The piece slowly dissipates, as the meandering melody fades into the background of the polychordal texture. A final 'strike,' sounds, echoing the earlier pops, but this time much more gaseous in its textural viscosity. Finally, the polychord fades to silence.

Section IV – Koechlin's *Vers la Voûte étoilée* – From Orchestra to Flammarion via the Telescope

To tie the musical analysis of *Vers la Voûte étoilée* into a broad reading of what popular astronomy meant to the consumers of telescopic magnification of the cosmos, Aubin suggests the philosopher Joseph Vogl. In the article *Becoming-Media: Galileo's Telescope*, Vogl argues that in looking *through* the telescope, one is looking anew. He writes, "Ultimately, all the phenomena and "messages" it [the telescope] produces bear the mark of theory. The sensory evidence transmitted by these messages is conveyed alongside the procedure by which that evidence was established." (Vogl 2007, 17) He goes on later to suggest that the telescope as a *medium* creates a peculiar and self-referential condition for observation. In essence, he argues that not only is the sensation of vision made anew when mediated by a telescope, but that the viewer is as equally placed – relatively speaking – via the telescope as the celestial object being view. To this end, *Vers la Voûte étoilée* acts as the telescope Camille Flammarion may have used and shared – not only to view the sky, but to view himself.

Koechlin's formal construction of *Vers la Voûte étoilée* suggests in its three major sections three potential objects being viewed. In the first section, the musical focus is on the endlessly deep, but narrow field-of-view of any telescope aimed toward the cosmos. The texture immediately suggests a kind of endlessness (via topical currents more generally reserved for associations with the ocean), and the ever unfolding, meandering melody is as much an artifact of traveling along the direction of sight

(e.g. closer and further from the viewer) as it is an artifact of “tracking” celestial objects as the Earth rotates.

The second major section (**B1** → **A1** → **A3**) reveals the humanity of the observer: Camille Flammarion. The music here plumbs the anxiety of astronomy, the always-present existentiality of truly *seeing* the cosmos alone is a cause of great anxiety. Juxtaposing that feeling of the very large with the important work of simultaneously taking meticulous and seemingly tedious care of the telescope itself leads inevitably to more layers of anxiety. If it is reasonable that the fundamental emotional state of the astronomer is a lingering, fluctuating anxiety, then the musical language Koechlin uses here captures that. The inability of the cadential chords to resolve properly, or even in a way that supports the emergent sense of harmonic rhythm that Koechlin prepares, is a manifestation of Koechlin wielding his theoretical might to create a specific sensation of anxiety. The proto-religious hymnal music these cadential failures accompany further accentuates this by squarely placing a fallible humanity (or at least a human-spirit) at the heart of the musical causality. Finally, the primordial cosmos music that emerges from the second cadential failure leaves no doubt as to the cause of this anxiety, which is quickly returned to in **A3**.

The final major section’s two subsections act as two illustrations (perhaps even blueprints) of the instrument at fault here. Section **B2** is a musical celebration of the telescope – both in its particular properties and more broadly regarding its singular role in history as the instrument that anonymized the world. Vogl writes: “When Galileo looks through the telescope at the moon, he not only sees another Earth, that is, a world, his concept of “world” changes with this view: the difference between Earth and other heavenly bodies is erased, and the Earth itself appears as a star among stars. The Earth is no longer the “dump heap of the filth and dregs of the universe” but becomes one in a multitude of worlds. (Vogl 2007, 19) In particular, regarding the specific properties of the telescope, the relative jaggedness

of textural changes in this section suggests a kind of optical refocusing or magnification. In the other sections, the textures dovetail smoothly, but here, the music switches (at each harmonic “balloon” pop) as if changing from 50x to 100x magnification. As section **B2** runs its course, finishing the telescope’s blueprints as it were, the true power of the instrument is revealed in the final section, **A4**. Here, the music thins away and a polychord sounds seemingly *ad infinitum*, and all that is left is the opportunity to continue seeing further – into space and into one’s self.

Camille Flammarion died on June 3rd, 1925; two years after Koechlin began working on this piece, and three years after he began working on the Nocturne in Eb minor that this work is based on. To suggest, therefore, that Koechlin conceived of this work as a eulogy to Flammarion suggests Koechlin jumped-the-gun a bit. Instead, the final section, **A4**, operates more as an acknowledgement of the continuum between the viewer and the object being viewed. This final musical utterance suggests that that continuum stretches (perhaps hyperbolically) into the future infinitely, though burdened by the entropy of the universe to always decay a little bit more. In essence, Koechlin’s *Vers la Voûte étoilée* is a triptych portrait of Camille Flammarion: the first image is of the cosmos, what Flammarion saw and shared with the world; the second image is of Flammarion himself, an astronomer anxious with the knowledge astronomy bestows; and the final image is of the telescope itself – a simple, powerful instrument wielded by humanity, but through which the romantic and real infinitudes are best perceived.

Section V – A Brief Coda

Charles Koechlin sought in *Vers la Voûte étoilée* to portray a great hero of French intellectual thought, Camille Flammarion in a deeply personal, musical, and artistically resonant way. Depicting the cosmos, both as Romantic trigger for contemplation and as scientific invitation, served Koechlin well in creating an aesthetic uniquely his own. Many of his contemporaries during this era saw, to varying

degrees, the future of music spring forth from atavism, primitivism, exoticism, and simply (as is better understood today) cultural appropriation/colonization. Yet, a decade after the *Rite of Spring*, Koechlin embarked on a work that pays respect to an explorer of the sky, not the poorly-understood cultures of the various aboriginals who now cohabitated with European colonists. Koechlin was more interested in looking up, into the future, not East and into the past. He is not the only composer so inclined, as the works, most notably of Edgar Varèse (1883-1965), the various *Futurists*, and Iannis Xenakis (1922-2001), would suggest. The aesthetics of the composers who find inspiration from astronomy are diverse, colorful, and changing. Yet, the through-line in them lies in the fact that these works are, by virtue of their exigency, titles, and/or cultural context, sonic telescopes – sounding as the viewed musical object while also reflecting the listeners onto themselves. The growth of popular astronomy in the late 19th century led to a new kind of musical expression, perhaps uttered first by Charles Koechlin, but since by countless others: music no longer sounds only through the petty looking-glass of fictions and astrology, but now through the telescope onto the scientific facts of a beautiful, terrifying, and infinitely indifferent universe.

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