Introduction: Formulating a global aesthetic

At the age of 26, while on summer holiday in Sussex, Virginia Woolf could most likely be found on a clear evening peering through a telescope at the moon and stars. "Tonight we speculated upon the stars;" wrote Woolf, "fancied ourselves moored, one of an innumerable fleet; & saw the earth shrink to the size of a button, its rim just over there where the lighthouse marks the sea. This shrinkage was the result of seeing the moon close at the end of a telescope, like a globe of frosted silver . . ." (*A Passionate Apprentice* 368). This single diary entry, written on an August evening in 1907, swells with themes that would become major preoccupations throughout her life's work. As she looked out into the night sky, Woolf became keenly aware of the earth as a tiny inhabited speck in the vast reaches of the intergalactic depths. Often she imagined the earth as a ship, tumbling and adrift in an incredible expanse – the abyss of space. Such an image magnified that drastic "shrinkage" of earth she sensed when peering at "the moon close at the end of a telescope."

The apparatus of the telescope had a powerful shaping effect on Woolf's aesthetic imagination. Through it she glimpsed tiny images of other worlds. The dusty craters of the moon reminded her of water drops in plaster of Paris, and in her diary she recorded observing the "cardboard collar" rings of Saturn. More importantly, those other worlds came to life for her at the end of her telescope. On that summer evening in 1907 the globe of the moon reminded her that somewhere, on the other side of the earth's globe, communities thrived under the warmth of an afternoon sun. The moon, she wrote,

> was, for the first time, a visible token, shining in dead of night, that the sun was still blazing somewhere, in an August sky. You could fancy hard blue & white, on the other side of the world; all the palms flashing, & the drone of heat; people sleeping under umbrellas; great melons, & donkeys with water skins, men lounging within the limits of hard black shadows - while here we walked in the vast darkness, & the

tobacco plants gleamed pale & their fine perfume powdered the air with sweetness. But through the telescope it is no longer moonlight; but the hot sun. . . . (*PA* 368)

Glimpsing the moon and stars against the hard black of the night sky indelibly impressed upon Woolf a vision that would help shape what I call her global aesthetic, as well as her pacifist politics. By that, I mean that those other worlds suggested to her something of what earth must look like from space, and, too, that the earth was indeed a planet moving through interstellar wastes. She realized that earth's inhabitants must rely on this small, fragile globe for their future survival.

This study offers an investigation of the interconnections between modernist British fiction and a pervasive popular interest in astronomy in the 1920s and 1930s in Britain and in the US. In the pages ahead, the cultural elements that gave rise to that interest are investigated. Grounded in the cultural studies of science, this study explores how modernist writers, and particularly Virginia Woolf, engaged and disrupted discourses of science within popular culture.

The networks that link Woolf's literary texts to the sciences have been of interest as early as May 1938 when Elizabeth Nielsen, an American literature student, visited with the Woolfs to discuss, Virginia noted, "Einstein, & his extra mundane influence upon fiction" (*D*5: 146). Woolf described Nielsen as "entirely distracted by Einstein" (*D*5: 146). At the time she first contacted Woolf, Nielsen was studying at Oxford. Woolf exchanged a few letters with her in October 1938 to say she had "not read Einstein; I should not understand it."[1] Since then Woolf scholars have investigated her interest in physics, Darwinian evolution, psychoanalysis, and the philosophy of science.[2] This study, alternatively, theorizes how Woolf's aesthetic perspectives, as well as her pacifist politics, were shaped by advances in astronomy and by emerging visualization technologies, ranging from large astronomical telescopes to the inexpensive hand-held camera. I have chosen Woolf's work as the particular site for my research as her texts represent a significant interface between literature, popular culture, and the sciences; however, the study additionally offers close readings of fiction, poetry, and non-fiction prose by an array of modernist British authors and science writers in the context of these converging phenomena.

Woolf's global aesthetic vision was inspired in part by her father, Leslie Stephen, who read widely in the natural sciences and was particularly interested in astronomy. A serious mountain climber in his younger years, Stephen claimed that the view of earth's surface from the top of Mont Blanc gave one a sense of the scale of things, of the "littleness" and "ephemeral

existence" of humankind (*The Playground of Europe* 262). Stephen's contemplation of humans in relation to the scale of things became an important theme for Woolf's writing. Then too, she was thinking about humanity's minute existence in relation "to the immensity of the sky" (*PA* 387) when, while traveling in Italy in 1908, she read Thomas Hardy's *Two on a Tower* (1882). Woolf described the novel as setting in "contrast the stars with minute human loves" (*PA* 386). In the novel, the astronomer Swithin St. Cleeve describes for Lady Constantine the "[t]wenty millions" of stars visible with a powerful telescope, as well as the great "voids and waste spaces of the sky" (*Two on a Tower* 31, 33). He explains that the stars "burn out like candles" to become "invisible cinders" (*Two on a Tower* 34, 35). Swithin, who studies variable stars which by the early 1920s would become the means of measuring the great distances of intergalactic space, tells Lady Constantine, "Of all the sciences, [astronomy] alone deserves the character of the terrible" (*Two on a Tower* 34, 35). The very terminology Hardy used to depict the vastness of space and the life cycle of stars would be echoed in James Jeans's popular science books of the 1920s and 1930s. A British mathematician and cosmologist, Jeans described the stars as the "unwanted ends of lighted candles burning themselves out," and characterized the universe as "terrifying because of its vast meaningless distances."[3] Woolf's sense of the insignificance and the ephemerality of humans on the cosmological scale may also have been inspired by the French astronomer and popular science writer N. Camille Flammarion, who wrote of the possibility of human extinction in some future eon when the sun's energy had dissipated. An illustration from his *Astronomie Populaire* (1881) depicts the last human family to expire as earth freezes over in the dim light of our dying sun (Figure 0.1).

As a new generation of astronomical telescopes in the early decades of the twentieth century opened up new vistas of space, popular audiences were awed by the immensity and seeming lifelessness of the universe. Earth, by comparison, was depicted by Jeans to be no more than a granule of sand, whirling blindly through the vast and uninhabitable vacuum of space. Popular science writers such as Jeans, Cambridge astrophysicist Arthur Eddington, mathematician Bertrand Russell, and physiologist J.B.S. Haldane explored the implications of the advances in astronomy that had effected what I call a modernist human decentering and re-scaling. Fascinated with the new vistas of space, Woolf read the work of these scientists and began developing literary strategies that responded to this re-scaling, and that offered possibilities for a radical rethinking of the social and political structures of her day.

Figure 0.1 **The Last Human Family.** This illustration published in Camille Flammarion's *Astronomie Populaire* (1881) was captioned: Surprised by the cold, the last human family has been touched by the finger of death, and soon their bones will be buried underneath the shroud of the eternal ice fields (translated by author).

Of the scientists she read, James Jeans particularly captivated Woolf's imagination. By the late 1920s, Jeans garnered international attention with the publication of his non-technical astronomy texts, which topped the best-seller booklists in Britain and in the US. With the release in 1929 of *The Universe around Us*, Jeans was catapulted into the public eye. By January 1931, the famous cartoonist Will Dyson had parodied the swiftness with which Jeans gained widespread attention. In one Dyson cartoon that ran in papers in Britain and the US, two Londoners gaze skyward. One exclaims, "How mysterious is the Universe!" in reference to Jeans's recently published volume *The Mysterious Universe* (1930), while his colleague replies, "Ah, indeed – almost as mysterious as Jeans's book!"[4] In England, Jeans became a national celebrity through his non-technical texts, as well as his public lectures and BBC broadcasts on developments in astronomy and the new physics. A serious mathematician highly respected by colleagues in mathematics, cosmology and observational astronomy, and in physics, Jeans in all probability was the most widely read of Britain's popularizers of astronomy and physics. His non-technical science books, illustrated with numerous photographs of far-flung galaxies, sparked a public fascination with stars and nebulae, as well as a concern regarding humans' decentered and ephemeral existence in a universe far older than even most scientists imagined. Woolf's fiction and essays demonstrate her own response to Jeans's work, and the images of intergalactic space she glimpsed in the pages of his non-technical publications.

In fact, Jeans's books, lectures, and BBC broadcasts are crucial in reimagining the popular milieu against which I read Woolf and other modernist writers. This study explores the breadth of his public appeal as well as the ways his non-technical texts shaped popular, literary, and artistic responses to the new vistas of space. The musical compositions of the prolific British composer Gustav Holst, for instance, were partly inspired by Jeans.[5] Holst read both *The Mysterious Universe* and Jeans's *Through Space and Time*, an expansion of public lectures given in 1933 (*Gustav Holst* 164). Interested not only in astrology but also in the science of astronomy, Holst had gained international visibility with a well-received sequence titled *The Planets* (1914–17), the music of which evoked the immensity and mysteriousness of the huge gaseous planets of our solar system.[6] He had also written a collection of songs based on poems by Humbert Wolfe, including one titled "Betelgeuse" after the red supergiant star in the Orion constellation.[7] It was largely due to Jeans, Holst's daughter Imogen has noted, that "Betelgeuse" became one of her father's favorite poems. "Betelgeuse, he knew, was the brightest star in Orion. And he knew that Sir James Jeans

had said: 'If Betelgeuse were to replace our sun we should find ourselves inside it, its radius being greater than that of the earth's orbit'" (*Gustav Holst* 139). Holst set these lines from Wolfe's poem to music in 1929:

> On Betelgeuse
> the gold leaves hang in golden aisles
> for twice a hundred million miles,
> and twice a hundred million years
> they golden hang, and nothing stirs,
> on Betelgeuse.
> (quoted in *Gustav Holst* 139)

The phrases regarding "twice a hundred million miles" refer to the colossal size of red giant stars, and red supergiants such as Betelgeuse, the diameter of which had been calculated in 1920 to equal 240 million miles. Virginia Woolf most likely knew of Holst either through BBC broadcasts of his compositions or his appointment as music director at Morley College in 1907 where she, for two previous years, had been teaching composition and literature courses (*L6*: 419, n. 3). Like Holst's, Woolf's own work reflects the inspiration she drew from Jeans.

However, evidence that would place Virginia Woolf in a room sipping tea and discussing the stars with James Jeans has not yet been found. Nigel Nicolson recalled that his mother Vita Sackville-West, Woolf's dear friend and one-time lover, "was also caught up with the fascinated love of astronomy, and [that] she did meet Jeans."[8] Jeans, in fact, once gave Nicolson one of his popular astronomy books. "I forget where it was," wrote Nigel, "but he gave me a copy of *The Universe around Us* in 1930, when I was 13, and I have it still."[9] Although Jeans clearly knew some of Virginia's friends and associates, he remained at the fringe of Bloomsbury. While at Cambridge, Jeans became friends with mathematician Godfrey Harold Hardy, who was in turn a colleague of Leonard Woolf and Saxon Sydney-Turner.[10] Having entered Trinity College in 1896, G.H. Hardy was elected to the Apostles two years later, "The Society" of which Leonard Woolf, Sydney-Turner, Roger Fry, Bertrand Russell, and many of Virginia's closest associates were members.[11]

An additional connection between Jeans and Leonard Woolf was Russell Kerr Gaye (1877–1909). Hardy and Gaye were Cambridge colleagues and both were members of a group called the Sunday Essay Society who met to discuss theological issues.[12] In February of 1903, R.K. Gaye wrote to his colleague Jeans, who had been recuperating from an illness: "The Sunday Essay is maintaining its character as a battleground between the rival

factions of its scholars."[13] One of those factions was "the mystico-nebular school consisting of [Saxon] Sydney-Turner, [Leonard] Woolf, and [Lytton] Strachey. . . ."[14] Yet, despite his oblique connections to what became Bloomsbury, Jeans and his popular science writing, as this investigation will show, was to play a considerable role in Woolf's formulation of a global aesthetics.

THEORETICAL FRAMING

Virginia Woolf and the Discourse of Science investigates how advances in astronomy, made possible by a new generation of telescopes in the early decades of the twentieth century, had a shaping effect on work by Woolf and other British writers who were her contemporaries, including Olaf Stapledon, Vita Sackville-West, Roger Fry, Bertrand Russell, H.G. Wells, T.S. Eliot and others. What follows is a study in Woolf's narrative experiments, her passion for science, especially astronomy, as well as those moments where her writing traversed advances in visualization technologies, astronomy and cosmology, and the technologies of global war. The study explores how large astronomical telescopes like the 100-inch at Mount Wilson Observatory, with which American Astronomer Edwin Hubble worked, brought into the purview of popular audiences spectacular vistas of spiral nebulae whirling millions of light-years from earth. Interdisciplinary in approach, this investigation ranges across a broad spectrum of cultural moments and literary works. Its scope extends from phenomena such as Halley's comet and Hubble's extra-galactic nebulae to a variety of modernist literary works and popular science texts.

Deleuze and Guattari proposed that a literary text might be considered a "little machine" that "must be plugged [in] in order to work" (*A Thousand Plateaus* 4). I have attempted to plug Woolf's texts into the literary, cultural, scientific, and technological networks associated with advances in astronomy in the early decades of the twentieth century. In so doing, it seems evident that Woolf's fiction and essays contributed to, and at times resisted, the popular response to discourses related to technology and the sciences. The methodology of my investigation is based on the work of Joseph Rouse, Donna Haraway, Bruno Latour, and others working in the cultural studies of science.[15] Using Latour's model of tracing "science in the making," this investigation concerns itself less with science as theory (i.e., astrophysics, evolution, relativity), than with science as an activity, and the facts and artifacts discourses of astronomy produced (*Science in Action* 15). Like Latour who attempts to articulate the "imbroglios" or networks of interconnection

between scientific practices and public and political discourse, I have set out to imagine the imbrication of advances in astronomy, emerging visualization technologies, and popular science writing, with discourses among modernist artists that produced in part Woolf's experiments in fiction (*We Have Never Been Modern* 3). Woolf's texts demonstrate how the new vistas of space emerged at the same time that modernist writers were forging new literary forms that might account for a modernist human decentering and re-scaling.

The research presented here situates itself within the current reassessment of modernism, and of Bloomsbury as effete and disconnected from the concerns of public audiences. Literary study of the interconnection between modernist texts and the sciences has focused on psychology, eugenics, physics, film technologies, and more recently the philosophy of science, but not as thoroughly on the import of advances in astronomy and cosmology. This study provides evidence of how significant these sciences were to the formulation of British modernism, and specifically links Woolf's work to the pervasive popular interest in cosmology. Letters exchanged between Virginia and Vita Sackville-West indicate their shared fascination with astronomy. Vita, for instance, while traveling through Persia in January 1926, wrote to Woolf that the landscape surrounding the tomb of Tutankhamen, in Luxor, Egypt, reminded her of "[d]esolation like the mountains of the moon."[16] A year later, while again in Persia, Vita mused in a letter to Virginia: "[T]here is one little asteroid, called Ceres I think, only four miles across, the same size as the principality of Monaco, on which I have often thought I should like to live, revolving in lonely state round the sun. It would be even better than my island in the South Seas. Did you know I had got an island in the South Seas? It has a banana tree on it."[17] A month later Vita reported: "There was a new moon over the poplars in the Isfahan garden . . . curtseying away from a star like the one we saw when we went for walk at Long Barn . . . but in a very different sky."[18] From Smoke Tree Ranch near Palm Springs, California, Vita wrote of her delight in seeing "[m]agnificent stars overhead, and mountains all around"; she commented that nature's fury had been following her with "hurricanes in the Atlantic, blizzards in Chicago, earthquakes in California . . . and a meteor which lit up five states for half an hour and came to rest in Arizona."[19] Recent scholarship on Woolf and technology has demonstrated the extent to which Woolf, Eliot, and other modernist writers were captivated by new technologies related to photography, cinema, radio, the gramophone, and motoring. Vita, in fact, reported to Virginia on the motor speed records set at Daytona by Sir Henry Seagrave.[20] While Woolf has traditionally

been considered detached from, even disdainful of, elements of popular culture, her fascination with the new vistas of space reflect that she too was immersed in this popular milieu. She was nevertheless critical at times of the deployment of some advances in technology and the sciences. Chapter Six examines her critique of specific instances of aggression in scientific practice, and explores her proposal in *Three Guineas* of feminist strategies for a scientific praxis that adopts a more global perspective.

Michael Whitworth points out that what is called popular science "can refer to 'best-sellers' with a genuinely popular sale, and to non-technical books of science which were never intended to have, or which never reached, a large audience."[21] While the term "popular" has multiple applications, in this study the term denotes public interests prevalent within a cultural milieu. In the study that follows, the term "popular" refers to expositions on the sciences that proliferated in a variety of media, some of which targeted a broad spectrum of readers. While readers of literary journals like the *London Mercury* or the *Athenaeum* may not have represented the same audiences who learned of advances in astronomy through daily newspapers, the variety of venues in which popular science expositions appeared illustrates the diversity of audiences fascinated with the new vistas of space. This fascination with astronomy, as this study will show, appeared to be irrespective of class and educational differences.

There were, of course, radically different formations of modernism and of popular culture in the US and in Britain. However, in Chapter One, I suggest that a transnational response to the work of Hubble, Jeans, and Eddington emerged as a result of the enhanced vistas of space made possible by a new generation of telescopes. That shared public experience might be identified as a participation in what Rita Felski calls the "popular sublime." She invokes the term to "highlight the significance of the aspiration to the transcendent, exalted, and ineffable as a central impetus of modern mass culture" (*The Gender of Modernity* 119).[22] Felski contends that the critical bracketing of the sublime as a "a high culture tradition stretching from Romantic poetry to the twentieth-century avant-garde has served to obscure the centrality of sublime imagery and vocabulary in many of the texts of modern mass culture" (*The Gender of Modernity* 120). She asserts that "literary representations of the aspiration to infinitude, transcendence, and boundlessness assume a much wider variety of forms than has usually been acknowledged in the critical literature" (*The Gender of Modernity* 120). Felski co-opts the sublime, associated with that which simultaneously inspires awe and terror, to identify in modern mass culture a desire for a "loss of self that ha[s] historically been gendered feminine rather than

masculine" (*The Gender of Modernity* 120). As an example of this, Felski cites a novel by Marie Corelli, *A Romance of Two Worlds* (1887), in which the female protagonist escapes her body to glimpse alien worlds in outer space: "I gazed upon countless solar systems. . . . I saw planets whirl around and around with breathless swiftness. . . . I could scarcely perceive the Earth from whence I had come – so tiny a speck was it – nothing but a mere pin's point in the burning whirl of immensities" (quoted in Felski 135). The romantic aspiration for the sublime that Felski locates in Corelli's novels, she claims, "emerges as a key element of the modern" (*The Gender of Modernity* 120, 121).

Felski's notion of a popular sublime perhaps best articulates the varied aesthetic, journalistic, and parodied responses to the great expanses of outer space that unfolded before an eager public in the pages of James Jeans's texts and to some extent in the daily press. Vita Sackville-West commented, in a review of Jeans's *The Mysterious Universe*, that the stars had an appeal that characters in a novel did not: "[I]n everyday life we are concerned with what affects our fellow-beings, and not with what goes on in outermost space. . . . Nevertheless, there is some grandiose suggestion about the path of a star which is lacking in the career of Mrs. Smith."[23]

The new vistas of space evoked something of the sense of the sublime that drew so many British climbers to mountaineering in Switzerland in the 1860s and 1870s, and to Nepal in the 1920s. Several English climbers, inspired in some cases by the sublime poetry of the British Romantics, were among the first to reach the peaks of the Swiss, Italian and French Alps, many of which topped 10,000 feet. As Chapter Three will show, Leslie Stephen ranked among the best of Britain's climbers. Jeans and Hubble would both travel to the Alps, but never climbed with the rigor of Stephen, or of the celebrated George Mallory, friend to John Maynard Keynes and Duncan Grant, and whose death on Mount Everest in 1924 made sensational news in the British press. Jeans, in fact, met his second wife Susi Hock in 1935 while climbing in the Alps; Susi had completed a climb to about 10,000 feet (*Sir James Jeans* xiv). And his first wife, Charly, published a poem about Kanchenjunga (28,146 ft.), the third highest mountain in the world, located in the East Himalayas.[24] The poem associated the mountain's imperviousness to human life with the cold light of the stars, and concluded with an image of the mountain's "white peaks cleav[ing] the deep skies" with its "company of stars" which "gleam down, enormous, liquid, bright,/Out of the black profundity of night" (*"Driftweed" and Later Poems* 94). A similar fascination with the sublime evoked by the unexplored regions of space filtered into popular culture in England and the US, as