

THE ASTRONOMY REFLECTED IN VIRGINIA WOOLF'S WORK

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Abstract. This paper is a short investigation of the interconnections between the life and work of Virginia Woolf, an outstanding modernist British writer, and a pervasive popular interest in astronomy in the 1920s and 1930s in Britain. The study seeks to explore the roots and development of Virginia Woolf's passion for astronomy and the way in which some of the popular discourses on astronomy of her epoch are reflected in her writings.

Key words: Astronomy in culture.

1. BACKGROUND

Virginia Woolf (1882 – 1941) was born Adeline Virginia Stephen on 25 January 1882 at 22 Hyde Park, London, the third of the four children of Leslie Stephen and of his second wife, Julia Prinsep Duckworth. As the writer herself mentions in her diaries, she was born into “a very communicative, literate, letter writing, visiting, articulate, and late nineteenth century world” (V. Woolf, *Moments of Being: Autobiographical Writings*, London: Vintage/Ebury, 2002, p.79.) Her father was an outstanding man of letters, a scholar in natural sciences and founding editor of the *Dictionary of National Biography*. Her mother was also an educated woman, who took upon herself the task of her children's initial training. Virginia Woolf considered that although she came from “an intellectual family, very nobly born in a bookish sense”, her education “was neglected”. This actually refers to the fact that in keeping with the custom of the epoch she was never sent to take any formal education in any of fields of knowledge she would have liked to learn and develop into a profession, such as “physics, divinity, astronomy...chemistry, botany, logic, mathematics”, “all... paid for education...not permitted to females” (Woolf, 2002, p.263).

Virginia Woolf and her sisters, unlike their brothers, were educated at home, but the truth is that her father, who had also been a Cambridge don, supervised attentively his children's education, and at the age of fifteen Virginia had the advantage of daily supervisions which were all the better for their informality. Virginia “bookishness” drew her closer to her father much more than his other children were. Writing absorbed her “ever since she was a little creature” and in April 1887 her father noted in

his own diaries that Virginia devoured books faster than he liked. The children were also encouraged to achieve self-education, and indeed Virginia continued with her own programme of reading throughout her life. After her father's death, in 1904, she, her brothers and sister Vanessa became part of networks of unconventional intellectuals, who met and socialized in order to debate the latest cultural and scientific issues of the time. The first group of this type in which she became deeply involved was the Bloomsbury Group, who gathered at the Stephens' new residence in Bloomsbury quarter, London, in the first decade of the 1900s. Bloomsbury Group was initially made up of her brother Thoby's Cambridge friends, and later came to include important personalities of the time, such as the philosopher and mathematician Bertrand Russell, who also had a great impact on Virginia Woolf's intellectual training. Astronomy was also one of the topics debated with friends, as shown in another diary entry of 18 December 1930: "Talk about the riddle of the universe (Jeans's book) [The Mysterious Universe] whether it will be known; not by us..." (D3:337) (H. Henry, *Virginia Woolf and the Discourse of Science, the Aesthetics of Astronomy*, Cambridge University Press, 2003, p.93).

In the early decades of the 20th century there were a number of advances in science, as well as astronomical events, such as Einstein's theories of relativity (Special Relativity was published in 1905, and the General Relativity was developed between 1907-1915), Hubble's discoveries that entire galaxies exist beyond the Milky Way (1922-1925) and that the universe is expanding (1928-1930), Halley's comet of 1910 and the total solar eclipse of 1927, which created an unprecedented high interest of the general public in astronomy in particular. Developments in science and astronomy were reported in daily newspapers, as well as in literary reviews and journals like the *London Mercury* or the *Athenaeum*, all in great demand because "the cinema was in its infancy and the wireless still a decade away. Television was the stuff of science fiction... Thus the only competition was the daily press" (Henry, 2003, p.16). "This fascination with astronomy ... appeared to be irrespective of class and educational differences" (Henry, 2003, p.9).

In the 1920s and 1930s astronomy had become more attractive than ever before also due to the pictures of comets, planets, and the vast vistas of the universe taken by the telescopes of the time, outfitted with cameras, which were reproduced by the press and in astronomy popularization books. On the whole this age of discovery helped shape the popular perceptions of the human relations to cosmological phenomena. However, the general result produced by the great number of photographs included in order to make accessible the mysteries of the universe for the readers was that they led to an increasing realization of human decentering and re-scaling in the vastness of space.

Actually, the traditional values of culture and society were greatly influenced and changed by a series of modern factors. Thus, the progress of technology, through

inventions such as the automobile, airplane and telephone shrank distances around the world and sped up the pace of life. Freud's theory of the unconscious and infantile sexuality radically altered the popular understanding of the mind and identity, and the late-nineteenth century thinkers Karl Marx and Friedrich Nietzsche in different ways undermined traditional notions of truth, certainty and morality. The rapid shift in theoretical science, from two-hundred-year-old Newtonian models to Einstein's theory of relativity led to an entirely new perception of reality.

All this acceleration of life and thought led to the appearance in Europe of a wave of experimental movements, sometimes collectively termed "modernist" because of their emphasis on radical innovation. In England this outbreak of modernist experiment influenced groups of interconnected intellectuals, many of them based in London. The main characteristic of modernist writers was their desire to break with established forms and subjects in art and literature. Many modernist writers rejected the traditional realistic representations and formal literary techniques. In the novel, writers such as James Joyce, Joseph Conrad and Virginia Woolf explored the Freudian depths of their characters' psyche through the stream of consciousness and interior monologue. In poetry, authors such as T.S. Eliot worked out a new style which made use of plain speech, experimented with free verse and often made use of disconnected images. Modernism in literature meant also the appearance of various typical themes, such as: the lonely individual, trying to find peace and comfort in a world characterized by a growing social isolation caused by mass industrialization; the questioning of the reality of experience itself; the search for a ground of meaning in a world without God; the critique of the traditional values of the culture; the loss of meaning and hope in the modern world, threatened by mass destruction made possible by the new war technologies and the exploration of the ways in which this can be faced.

V. Woolf's diaries, essays and fiction show that she was aware of the most important social, literary and scientific events of her time. There is ample evidence in her diaries, as well as in her friends' records, that she not only read about these topics, but also had the opportunity to learn how they were debated in the intellectual circles she frequented and in the journal the *Athenaeum* (later to become *Nation & the Athenaeum*) where she and her close friends, especially those from the Bloomsbury group published their essays or reviews. Her husband, Leonard Woolf was editor of this journal for several years, and also published there many reviews, some concerning popular science writers such as Eddington, Russell and Jeans.

James Jeans's popular astronomy texts and BBC lectures had sensitized Woolf to humans' ephemeral and non-privileged position within the frame of cosmological space and time. Indeed, Jeans explained that Hubble demonstrated that the universe was far older and vaster than even cosmologists had previously imagined. Woolf understood the larger implications of Hubble's reconfiguration of the universe, and

the implicit decentering of humans that the 100-inch Mount Wilson telescope helped produce. Those images of spiral galaxies whirling millions of light years from earth, published largely in popular astronomy books like those by James Jeans and Arthur Eddington only further diminished that confidence in human centrality which was already being abraded in her father's generation by Darwin's evolutionary theory. James Jeans wrote in *The Universe Around us*: "To the question, where does man stand in the universe? the first attempt at an answer, at any rate in recent times, was provided by the astronomy of Ptolemy: "at the centre". Galileo's telescope provided the next, and incomparably better, approximation: "man's home in space is only one of a number of small bodies revolving round a huge central sun". Nineteenth-century astronomy swung the pendulum still further in the same direction, saying: "there are millions of stars in the sky, each similar to our sun, each doubtless surrounded, like our sun, by a family of planets on which life may be kept in being by the light and heat received from its sun". Twentieth-century astronomy suggests, as we shall see, that the nineteenth century had swung the pendulum too far; life now seems to be more of a rarity than our fathers thought, or would have thought if they had given free play to their intellects" (Sir James Jeans, *The Universe Around Us*, Cambridge University Press, 1930, p.8).

2. ASTRONOMY- A LIFELONG HOBBY

V. Woolf's interest in science and astronomy was surely inspired first by his father. At Cambridge Leslie Stephen developed into a competent mathematician and through a fellowship also studied philosophy and German. In 1857 he went on a walking tour through Germany and at the end of it he got his first view of the Alps. He was 25 years old and in excellent physical condition. Then began his relatively brief, but intense career as a mountaineer, which lasted for seven years, which helped him become a writer. He became a charter member of the Alpine Club and one of his early presidents. In 1860 he began to write essays on his mountaineering incursions, which he collected and published for the first time in 1871 under the name "The Playground of Europe". His mountaineering experience, combined with his broad scholarly knowledge made him state in some of his essays philosophical principles that reflected the Darwinian view on the status of man, among which the ephemerality of human existence by comparison with that of Nature. His essays show in general that he must have been broadly informed on many scientific subjects, astronomy included. Thus, the interest in astronomy shared by the entire Stephen family, mentioned in some of Virginia Woolf's diaries, must have been inculcated by her father. Virginia Woolf was influenced by his philosophical ideas on human existence in her writing from the start of her literary career.

Coming back to the Stephens' interest in astronomy, "There was apparently a Stephen family story of a young painter's spectacular success, which he could never repeat", "supposedly a painting titled *Earth Rise from the Moon*" (D1:190, n 8) (Henry, 2003, p.73) Woolf also recalls having imagined how she might appear to a non-human observer "I seemed to see...myself...as if a moon visitor saw me...[B]ut I can't recapture the queer impression I had of its being earth life seen from the moon" (D:190-I) (Henry, 2003, p.73). Sky gazing and the analysis of man's relation to the universe remained an intense hobby with her throughout her life. Thus, the critic Hermione Lee notes in one of the most prestigious biographies of Virginia Woolf, "On holiday in 1907, looking at the moon with Adrian, she experienced a feeling of "dreadful weariness" at the thought of "wandering not quite alive, not yet suffered to die, in this pale light...when she looked at the stars through a telescope she could imagine the earth shrink to the size of a button". She was intensely conscious (as she would always be) of a prehistory underlying the civilized world which makes it seem fragile and evanescent.

V. Woolf's fascination with astronomy and the telescopes pervades her entire work. Holly Henry, Associate Professor of English at California State University points out some of the most edifying examples to this effect in her book. Thus, we are told that in April 1929, for instance, Woolf wrote of having viewed the "craters of the moon" through a telescope owned by (her friend) Vita Sackville-West: "There I saw silver white & like the spots that are made by water dropping into plaster of Paris through Vita's telescope the other day" (D3: 222). "So great was Woolf's interest in astronomy that Vita investigated the possibility of installing a planetarium at her home, Long Barn until Vita learned it would cost roughly 20,000" (Henry, 2003, p.57). The same work also mentions that "Later, in 1938, Woolf was invited by her friend Elizabeth Williamson, an assistant in astronomy, at University College London, to one of the university's Gower Street observatory domes to peer at the moon and stars" (idem) and also that the "same year Woolf obtained her own telescope, actually from Williamson, and had it set up at Monks House, the Woolf's summer home". Virginia recorded Leonard's "brilliant idea of converting half the library into an open air verandah with glass doors, in which we can sit on a hot night & survey the stars" (idem). From this small observatory Virginia Woolf continued to observe the sky until the final months of her life. The knowledge she permanently sought and gained in astronomy and the use of the telescope were for her also means of experimenting with narration. She developed her own literary telescopic perspectives which are too ample and sophisticated to be discussed here and should make the topic of another paper.

"It seems that Woolf took part in many astronomical events or public debates related to astronomy. Thus, on the occasion of the total solar eclipse of June 1927, which was visible in England and was widely celebrated by the British public, the

Woolfs, together with their friend, Vita Sackville-West, “were among those fascinated millions armed with smoke glass who flocked to the path of totality in hopes of glimpsing the event” (Henry, 2003, p.9). This event is almost professionally presented in her diaries, as well as in a magnificent literary form in one of her masterpiece novels, “The Waves”. We have found in Holly Henry’s book excerpts from her diaries and an appropriate critical commentary to this effect.

“We began to get anxious”, wrote Woolf; “we saw rays coming through the bottom of the clouds. Then, for a moment we saw the sun, sweeping it seemed to be sailing at a great pace & clear in a gap; we had out our smoked glasses; we saw it crescent, burning red; next moment it had sailed fast into the cloud again; then only a golden haze...” (D3:143). Woolf clearly knew the science of the event she was observing. She noted the crescent sun partly obscured by the moon. Those “red streamers” she glimpsed were most likely coronal streamers or solar prominences” (Henry, 2003,p.23). There is a short quotation from the novel *The Waves* including a presentation of the event: “There is a spark there. Next moment a flush of dun. Then a vapour as if earth were breathing in and out, once, twice, for the first time. Then under the dullness someone walks with a green light. Then off twists a white wraith. The woods throb blue and green, and gradually the fields drink in red, gold, brown. Suddenly a river snatches a blue light. The earth absorbs colour like sponge slowly drinking water. It puts on weight; rounds itself; hangs pendent; settles and swings beneath our feet..So the landscape returned to me; so I saw fields rolling in waves of colour beneath me, but now with this difference; I saw but was not seen. I walked unshadowed.” (Virginia Woolf, “*The Waves*”, Oxford University Press, 1998, p. 193).

This knowledge about the sky was in part the result of her passion for observation: “On summer nights, I would lie with the window open, looking up at the sky, thinking, for I recall a story I wrote then, about the stars and how in Egypt some savage was looking at them; and also listening” (Woolf, 2002, p.129). Sky observation is present almost in her entire fictional work, and sometimes seems to indicate a significant astronomical knowledge of her literary characters, as the following excerpts from the novel *The Years* show: “The stars seemed pricked haphazard in the sky, except that there, to the right over the chimney pots, hung that phantom what barrow- what did they call it? [The constellation Ursa Major, known as the Plough]. The name escaped her. I will count them, she thought, returning to her note book, and had begun one, two, three, and four...”(V. Woolf, *The Years* ,London, Vintage, 2004, p.265). “Stretched flat on the bed, she saw the moon; it seemed immensely high above her. Little vapours were moving across the surface. Now they parted and she saw engravings chased over the white disc. What were they, she wondered mountains? Valleys? And if valleys, she said to herself half closing her eyes, then white trees; then icy hollows...”(Woolf, 2004,p.97).

It was her unquenched thirst for knowledge and passion for astronomy that prompted her to read and interpret the best popular science books of her time.

3. JAMES JEANS'S IMPACT ON VIRGINIA WOOLF'S FICTION

The astronomical advances made possible by the modern telescopes, as well as by Einstein's relativistic theory, created such a demand for new scientific information, of astronomy in particular, that leading publishing houses, such as Cambridge asked some of the most renowned astronomers of the time to write popular science books intended for a large category of readers. One of the science writers of the 1920s noted that "Popular science books would become 'serious rivals of modern novels and poetry' ...because they are more dramatic, they open up larger vistas, they are as well written, and they are cheaper" (Henry, 2003,p.18).

Two scientists in particular played a significant role in heightening Britain's popular interest in astronomy and cosmology, namely the mathematician and cosmologist James Jeans and the astrophysicist Arthur Eddington. Their popular science works had such a great impact on the general audiences that the BBC invited them to present their theories also in wireless broadcasts. Popular exhibitions were also organized for a more efficient popularization of their works. Of the two James Jeans became the most popular due to the fact that his topic new, thought provoking views of the universe were amply illustrated with many photographs, most of which taken from Mount Wilson Observatory, and also to his style, which combined an authoritative knowledge of the subject with a vivid turn of phrase. This astronomer's impact on the British general public and on the intellectual modernist elite in the first decades of the 1900s has been little investigated so far, in spite of the numerous evidence in the various records of the time to this effect.

A mathematician by training, Sir James Hopwood Jeans (1877 - 1946), began his career as a professor in applied mathematics at Princeton University in the U.S and Cambridge, Britain. His most important technical works include *The Dynamical Theory of Gases* (1904), *Theoretical Mechanics* (1906), *The Mathematical Theory of Electricity and Magnetism* (1908), and *Introduction to the Kinetic Theory of Gas* (1940). His best technical work in astronomy is considered to be *Astronomy and Cosmogony* (1928). The book summarizes his main original investigation, which refers mainly to the fact that gravitational condensation was the only energy in stars. At the close of *Astronomy and Cosmogony* Jeans asks several questions, which were to become the central topics of his subsequent popular books: "What is the relation of life to that universe, of which, if we are right, it can occupy only so small a corner? What, if any, is our relation to the remote nebulae, for surely there must be some more direct contact than light can travel between them and us in a hundred million

years? Do their colossal uncomprehending masses come nearer to representing the main ultimate reality of the universe, or do we?...Or is our importance measured solely by the fraction of space and time we occupy space infinitely less than a speck of dust in a vast city, and time less than one tick of a clock which has endured for ages and will tick on for ages yet to come? ”(Sir James Jeans, *The Universe Around Us*, Cambridge University Press, 1930, p.7).

In the course of his publishing career Jeans rethought his position on the rarity of life in the universe and in the 1944 edition of *The Universe around Us* he reported that given the great number of planetary systems in space there must be other replicas of our solar system and of our planet Earth.

In 1928 he retired from his university post at Cambridge in order to devote his entire time to research and writing. His wife was well-to-do and, in due course, he obtained considerable income from his popular works. Popular astronomy writing was now becoming the main focus of his interest. The first popular book written at the request of Cambridge Publishing House, presenting his reflections as a mathematician on the ultimate problems of the universe was *The Universe around Us* (1929) which was a huge popular success and “catapulted” the author “into the public eye”. It was immediately followed by a sequel, *The Mysterious Universe* (1930). Other books followed in quick succession and won immediate widespread fame: *Eos and the Wider Aspects of Cosmogony* (1929), *The Stars in their Courses* (1931), *The New Background of Science* (1933), *Through Space and Time* (1934). The essence of the theories presented in these books is the one eloquently summarized in the excerpt from *Astronomy and Cosmogony*.

Jeans’s technical and popular work was also highly appreciated in the US, where ever since his days as professor at Princeton University he had maintained close contacts with American colleagues such as G.E. Hale, the founder of Mount Wilson Observatory and Edwin Hubble. In 1923 he was accorded the rare honor of being appointed a research associate of the above mentioned observatory, a position he held until 1944, a period when he occasionally did working stages at Mount Wilson Observatory. It was partly through Jeans that Hubble’s discoveries of the extragalactic nebulae and the expansion of the universe were popularized in Britain. Jeans also approached Einstein’s relativistic theory in public lectures and essays in a manner that should make it accessible to the general public. Although James Jeans was on the fringe of the intellectual circles frequented by Virginia Woolf and there is no evidence that they ever met or talked, there are numerous records in her diaries as well as in the personal papers of her friends that she read his books and had the opportunity to hear them debated, especially in the pages of the *Athenaeum*, in the daily press and there is also the possibility that she might have listened to his BBC wireless lectures.

Some of the ideas put forward by Jeans were not new to Woolf. She had learned

from her father and then developed through her constant and passionate perusal of the sky the idea that humankind and our planet inhabited but a little, ephemeral and minuscule position in the universe. On the basis of the latest astronomical discoveries of the early 1920s Jeans enlarged Woolf's astronomical perspective and knowledge and made her consider that the brevity of human existence in relation to the billions of years of cosmological time called for more appropriate literary means of describing human existence.

There is ample evidence in Woolf's diaries that she was reading Jeans as she was writing and revising her masterpiece *The Waves*, between 1930 and 1931. Whole passages from Jeans's earlier popular books on astronomy *The Universe Around Us* and *The Mysterious Universe* are reflected especially in her novel *The Waves*, as well as in the subsequent ones *The Years* (1937), *Three Guineas* (1938), *Between the Acts* (1941).

From Holly Henry's book we learn that in December 1930 "Woolf noted in her diary that she had been working on the *Waves* and reading Jeans. She was paging through either Jeans's earlier popular book on astronomy *The Universe around Us* (1929) or *The Mysterious Universe* (1930). We had at our disposal only *The Universe Around Us* and after reading it we came to the conclusion that Woolf seems to have taken almost entire passages from this book and given them a literary shape not only in *The Waves*, but also to certain extents in her later novels".

Here is a quotation from *The Universe Around Us* where Jeans contends that man's ephemeral existence and very limited possibilities reduce him to an insignificant position in the universe, "Man Only knowing Life's little lantern between dark and dark wishes to probe further unto the past and future than his brief span of life permits" (Jeans, 1930, p.329-330).

In *The Waves*, the same idea is echoed in a similar way by one of the main characters, Louis: "No, but I wish to go under; to visit the profound depths; once in a while to exercise my prerogative not always to act, but to explore; to hear vague, ancestral sounds of boughs creaking, of mammoths; to indulge impossible desires to embrace the whole world with the arms of understanding. Impossible to those who act, but I am aware of our ephemeral passage" (Woolf, 1998, p. 89).

In Jeans's view "the ultimate realities of the universe are at present quite beyond the reach of science, and may be and probably are...for ever beyond the comprehension of the human mind" (Henry, 2003, p. 120).

One of the characters in *The Waves*, Bernard, reflects that in the same way that "To speak of knowledge is futile. All is experiment and adventure. We are for ever missing ourselves with unknown quantities" (V. Woolf, *Between the Acts*, Penguin Books, 2000, p. 130).

According to Jeans human history is so short in comparison with that of the universe that humankind seems to have emerged just the other day from the primitive

epoch. In his other widely read volume *The Mysterious Universe*, Jeans used the analogy from Platon's *Republic* to illustrate the limited possibilities of man and of the astronomers even in his time to study the worlds beyond the Milky Way "...we are still imprisoned in our cave, with our backs to the light, and can only watch the shadows on the wall. At present the only task immediately before science is to study these shadows, to classify them and explain them in the simplest way possible" (Woolf, 1998, p.60).

"Science is the religion of the future" asserts one of the characters in *The Years*. In *Between the Acts* Woolf agrees with Jeans that human history is so short in comparison with that of the universe surrounding it that even at the beginning of the 20th century man seemed to have recently emerged from his primitive cave: "...It was night before roads were made, or houses. It was the night that dwellers in caves had watched from some high place among rocks. Then the curtain rose. They spoke" (Jeans, 1930, p.317).

One popular idea of Jeans was that life appeared as a result of an accident in a vast universe, which is almost hostile to any form of life: "Is this, the, all that life amounts to to stumble, almost by mistake, into a universe which was clearly not designated for life, and which, to all appearances, is either totally indifferent or definitely hostile to it, to stay clinging on to a fragment of grain of sand until we are frozen off, to strut our tiny hour on our tiny stage with the knowledge that our aspirations are all doomed to final frustration, and that our achievements must perish with our race, leaving the universe as though we had never been?" (Jeans, 1930, p. 317-319).

It was another idea taken over by Woolf in *The Waves*, where Louis ponders on man's status in the universe, echoing Jeans queries: "I am conscious of flux, of disorder; of annihilation and despair. If this is all, this is worthless. Where then is the break in this continuity? What is the fissure through which one sees disaster? The circle is unbroken; the harmony complete. Here is the central rhythm; here the common mainspring. I watch it expand, contract; and then expand again. Yet I am not included" (Jeans, 1930,p.319).

In 1929, in *The Universe around Us* Sir James Jeans revived the old arguments about the heat death of the universe. The idea of universal heat death of the universe was launched in the 1852 by William Thomson, 1st Baron Kelvin, one of the authors of the second theory of thermodynamics. He held fundamental beliefs in the indestructibility of energy (the first law of thermodynamics) and in the universal dissipation of energy (stipulated by the second law of thermodynamics). According to W. Thomson's supposition, if the universe lasts for a sufficient time, gradually all its energy will become evenly distributed. According to the second law, atoms, when left to themselves, will mix and randomize themselves as much as possible. Thomson coined the term "heat death" for the end of the universe, meaning actually

the end of all physical phenomena. The universe will lose all its energy, which will eventually transform into motion and hence into heat. Thus, a state of equilibrium will be reached, with the same temperature everywhere. All life will cease and the universe will slowly become an endless expanse of undifferentiated particles.

In *The Universe Around Us* Sir James Jeans sustains that although the first principle of thermodynamics states that energy is indestructible, the second principle of thermodynamics completely denies this possibility, "Energy is indestructible as regards its amount, but it continually changes in form, and generally speaking there are upward and downward directions of change" (Jeans, 1930, p.320). He further contends that energy must be thought of not only in terms of "quantity", but also in terms in "quality": "All this shows that we must think of energy, not only in terms of quantity, but also in terms of quality. Its total quantity remains always the same; that is the first law of thermodynamics. But its quality varies, and tends to vary always in the same direction. Turnstiles are set up between the different qualities of energy; the passage is easy in one direction, impossible in the other. A human crowd may contrive to find a way round without jumping over turnstiles, but in nature there is no way round; this is the second law of thermodynamics. Energy flows always in the same direction, as surely as water flows downhill" (Jeans, 1930, p.321).

He foresaw the final end of the universe in the following way: "Energy cannot run downhill for ever, and, like the clock-weight, it must touch bottom at last. And so the universe cannot go on for ever; sooner or later the time must come when its last erg of energy has reached the lowest rung on the ladder of descending availability, and at this moment the active life of the universe must cease. The energy is still there, but it has lost all capacity for change; it is as little able to work the universe as the water in a flat pond is able to turn a water-wheel. We are left with a dead, although possibly a warm, universe a "heat-death" " (Jeans, 1930, p.343). In this passage there are many similarities with William Thomson's hypothesis, namely that the universe losses its energy through the latter one's transformation into ever weaker mechanical motion, until all motion exhausts in time. With both scientists the end of the universe is tantamount to a final, endless state of warm equilibrium, void of all kind of life. In keeping with his heat-death theory Jeans also asserted in *The Universe Around Us* that "With universes as with mortals, the only possible life is progress to the grave" (V. Woolf, *A Room of One's Own*. Three Guineas (Oxford University Press, 2000), p. 365).

This idea is also presented in *The Waves*: "But listen, said Louis, to the world moving through abysses of infinite space. It roars, the lighted strip of history is past and our Kings and Queens, we are gone; our civilization, the Nile; and all life. Our separate drops are dissolved; we are extinct, lost in the abysses of time, in the darkness" (Woolf, 2004, p.343).

However, Jeans contended that although the future of the universe was bleak,

that of mankind should be considered optimistically, as there were still billions of years until the end of the universe and of life on earth, and astronomy had great changes and possibilities to make tremendous discoveries until then: "...the main message of astronomy is one of hope to the race and of responsibility to the individual of responsibility because we are drawing plans and laying foundations for a longer future than we can well imagine" (Gordon, 2007, p.21-22).

Virginia Woolf entertained sometimes similar optimistic views concerning the future of humanity. In *Three Guineas*, a literary polemic, one of the authoress's purposes was "to discuss with you the capacity of the human spirit to overflow boundaries and make unity out of multiplicity. But that would be to dream to dream the recurring dream that has haunted the human mind since the beginning of time, the dream of peace, the dream of freedom" (Woolf, 2004, p.344).

Having experienced the horrible events of the two world wars in her lifetime Virginia Woolf was also aware that humanity depended on this fragile Earth for its future survival and astronomy was one of the liberating vistas of progress which man had at its disposal, as she stated many times in her works, and also in a simple and most edifying message at the end of her novel *The Waves*: "The sun had risen and the sky above the houses wore an air of extraordinary beauty, simplicity and peace" (Idem).

4. CONCLUSIONS

In her fiction Virginia Woolf experimented largely with the re-scaling of humans in the universe. She continues to remain one of the most complex figures of modern British literature, whose work consists of 9 novels, 4000 letters, 400 essays and 30 volumes of diary, which reflect not only her attempts to introduce modern literary techniques, also but also her multitude of interests in the most complex fields of knowledge such as physics, Darwinism, psychoanalysis, the philosophy of science, and last but not least astronomy.

Virginia Woolf's passion for astronomy is totally understandable and explainable. She considered herself "a restless searcher" all her life. She was in fact a spirit always thirsty for knowledge. "Why is there not a discovery in life?" she asks in her diaries. In her biography presented in the *Oxford Dictionary of National Biography* we are told that "Each afternoon, when she took long walks, London itself beckoned as an unexplored land. Crossing Russell Square, close to home, she sensed "the infinite oddity of the human position" and felt, she said "my own strangeness, walking on the earth".

It is natural that she should find in astronomy an endless vista for analysis and contemplation that liberated her restless spirit and elevated her to a higher knowledge

of the world and of the universe, which she sought to impart to her fellow beings through her entire work.

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