14 A Galaxy of Appearances

Anton Pannekoek and the Planetary Cinema of Jeronimo Voss

Alena J. Williams

Abstract

Since 1923, the Carl Zeiss optical manufacturing company in Jena had begun producing machines for its newly developed projection planetariums worldwide. Both phantasmagoric illusion and pedagogical tool, the projection planetarium was a hybrid object with affinities to Dutch astronomer Anton Pannekoek's methodological approach towards the visual representation of the Milky Way Galaxy. His approach to preparing this representation of the Milky Way emphasized the subjectivity of perception, and the means by which our visual understanding of the galaxy are governed by a range of influences and contingencies. This chapter examines the remobilization of historical concepts of phantasmagoria in contemporary artist Jeronimo Voss's work in relation to Pannekoek's pioneering studies on the representation of the night sky.

Keywords: planetarium, representation, socialism, phantasmagoria, visualization

In the research of Dutch astronomer and socialist Anton Pannekoek (1873-1960), the Milky Way was a bewitching paradox of appearances and disappearances. Within that inky darkness, endless particulates and matter obscure the galaxy's own image. Under ideal conditions for observation, the shape of the Milky Way shoots up from the horizon, cutting obliquely into the sky, and although these elements may render the general contours of the Milky Way visible, there is so much that is not visible. Pannekoek reached towards these vagaries and lacunae in order to grasp the Milky Way's vast immensity. Throughout a large part of his

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career as a researcher and professor of astronomy, he collected drawings from colleagues and sources dating as far back as Antiquity. He believed that the only true manner to represent this faint, voluminous body was to collect impressions from multiple sources rather than from a single, subjective observer. In fact, so intense was Pannekoek's preoccupation with the accumulation of particularities from these different viewpoints that he believed they might cohere into a general picture, a so-called 'mean subjective image' of the galaxy.[1] Central to this project was his emphasis on the subjectivity of perception, and the fact that our visual understanding of the galaxy is governed by a range of subjective factors. However, Pannekoek's interest in the subjective nature of appearances, while unconventional within astronomy and the natural sciences, was predicated upon ideas that have been fundamental to the analysis of images within the visual arts. This essay examines the relationship between Pannekoek's ideas and the recent work of contemporary artist Jeronimo Voss.

Since completing his studies, Voss has been interested in subverting the prevailing hegemonies of time and progress, by entangling revolutionary history with the phantasmagorical art of projection. In 2012, for the international exhibition documenta 13 in Kassel, he created *Eternity Through the Stars*, an art installation and planetarium projection work that re-examined the speculative text *L'éternité par les astres: hypothèse astronomique* (1872) written by French revolutionary socialist Louis-Auguste Blanqui (1805-1881).[2] Reflecting upon the political implications of Blanqui's hypothesis of infinite worlds and eventualities, Voss exhibited documentary images and artifacts in Kassel's Orangerie, a reconstructed castle in the Karlsaue state park. On oversized transparencies hung in groups vertically

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1 In 1920, Anton Pannekoek said of his method of combining and comparing individual (and thus subjective) drawings of the Milky Way: 'Here emerges the importance of many independent researches. Their differences offer a representation of objective uncertainties, which exceed the borders of subjective certainty. […] Generally speaking, the accidental-subjective, the manner of each observer, greatly disappears. What remains is not an objective image of the Milky Way, but something one could call the mean subjective image – the objective image as it is transformed through the conditions of general physiological-psychological observation' (Pannekoek 1920, 16, my translation). For an excellent overview of Anton Pannekoek's research on the representation of the Milky Way, see Tai 2017.

2 In *L'éternité par les astres: hypothèse astronomique*, Blanqui – an activist of the French revolts of 1830, 1848, and an influential organizer of the Commune – reached towards the natural philosophy of astronomy in order to mobilize a critique of the contemporary social order. See Blanqui [1872] 2013, 69.

and perpendicular along the walls of the building's exhibition spaces, viewers encountered reproductions of mechanical projection slides, including *The Solar System, showing the Revolution of all the Planets, with their Satellites round the Sun* (London, 1849); street views of *Paris, Rue de Flandre, March 1871* and planetary nebulae; as well as visual montages, like *Barricade Drawing with Jovian Planet* [Jupiter].[3] Within the planetarium itself, twelve synchronized digital projectors threw images of worlds and stars – along with historical images from the Paris Commune and magic lantern slides from the collections – onto the inner surface of the dome, encircling the viewer. A voiceover, in which a woman explains Blanqui's astronomical hypothesis, focused on Voss's understanding of the text's radical subversive potential: that all possible variations of our own past, present, and future are real material facts located within infinite space – a worldview that conceptualizes history as a product of collective decisions rather than as an independent stream of time. Moreover, reflecting Blanqui's idea of infinite return, these correspondences in the work – shuttling between sites of the Paris Commune, the astronomical cabinet in Kassel, the (meta)physical aspects of the universe, and the contemporary viewer – continually stage media within a complex system of (re)invention.

It also bears witness to the fact that the night sky – with its countless stars and heavenly bodies – has been of interest to scientists, philosophers, and visual artists for centuries. Central to that impulse to represent, and by turns, to know the universe has been the evolution of the planetarium, which Voss redeploys today within differing aesthetic and political contexts. Widely popularized in the 1920s, the modern projection planetarium – developed by the Carl Zeiss optics company in Jena in 1923 – signalled a major shift in the system of representation of the stars and planets, away from a range of astrophysical devices, including celestial globes and orreries developed since Antiquity. Housed within a seated theatrical auditorium with a projection device at its centre, the modern planetarium, though incomparable to its infinite vastness, afforded viewers highly illusionistic views of the night sky thrown up against the interior wall of the structure. Pivotal to the development of the project was the introduction of the self-supporting dome, which had a genealogical connection to a number of large-scale mass entertainments of the nineteenth century, namely Irish artist Robert Barker's large-format paintings and panoramas first developed in 1792. It was upon the planetarium dome's inner surface that the projection of tungsten light simulated the night sky as it passed through glass plates with punched-out

3 Palmieri 2012.

Figure 14.1 Inverted Night Sky (2016) by Jeronimo Voss

Source: Gert Jan van Rooij/Stedelijk Museum Bureau Amsterdam (SMBA)

copper foils, each representing different star constellations and clusters totaling to nearly 4,500 stars.[4]

Significantly, the Zeiss company integrated Pannekoek's drawings of the contours of the Milky Way Galaxy into the planetarium's projection systems already by 1927.[5] Almost a century later, these charcoal drawings became the wellspring for Voss's *Inverted Night Sky* (2016), a recent multisensory installation the artist created for an exhibition at the Stedelijk Museum Bureau Amsterdam (SMBA). Explicitly engaging with the scientific, social, and political history of the visual Milky Way, the work utilizes three different modes of representation: a dome projection, multiple large-scale transparencies, and sound. The introduction of the dome within the exhibition space migrates the planetarium's *dispositif* into the exhibition context. Voss deploys his planetarium as a portable architectural structure, hanging it at

4 Henry King and Joachim Krausse have comprehensively summarized the complexity of these mechanical and optical systems in their numerous iterations; see King and Milburn 1978 and Krausse 1993. My previous research on the relationship between the planetarium and artistic practice was presented at the conference, *Das Planetarium als Medium kosmologischer Reflexion*, as part of the DFG-Projekt: Zeit – Bild – Raum, Technische Universität Berlin on 26 April 2013. See also Williams 2015.

5 Tai 2017, 201.

a 45-degree angle and suspending it above the floor such that it can both be entered and viewed at a distance. Within it, a mobile spectator encounters contemporary video recordings of interior rooms of the Anton Pannekoek Institute for Astronomy at the University of Amsterdam (see Figure 14.1). Pannekoek's charcoal Milky Way drawings – again seen as an inversion in the digital video – render the stars as sparkling white dots against a dark sky. Directly across the room, Voss also mounted a series of large transparencies onto five large framed panels onto the wall. Printed upon them are reproductions of the scientist's charcoal drawings and different star maps with red outlines and blue areas of contoured colour. These isophotic lines describe the relative brightnesses of the galaxy's areas of light and shadow. Archival documents and documentation of the Zeiss planetarium and its Milky Way projector also appear in these panels. As the viewer leafs through them, the images become superimposed upon one another in real time; one has the sense of assembling a general overview of the stars from a montage of fragments and idiosyncratic particularities. It is a synthetic approach very much in keeping with Pannekoek's methodology of capturing the Milky Way.

In contrast to leading figures in the field who made great efforts to quantify the stars, Pannekoek's astrophysical research emphasizes the value of compiling and synthesizing subjective points of view of the Milky Way from multiple perspectives. Under his proposed system, a nearly untrained observer should, under optimal viewing conditions, render the relative brightness of the sky, and its particularities – specific stars and notable features – by way of naked-eye observations of the Milky Way Galaxy and handmade drawings.[6] At the turn of the twentieth century, the medium of photography offered astronomers a more systematic means of representation; however, Pannekoek found photography difficult in exactly calibrating the relative brightness of stars, and as some scholars have pointed out, the medium was much more useful for the purposes of astronomical classification than capturing astronomical particularities.[7] Although drawings were subjective images, Pannekoek argued that the 'accumulation' of unique observations from a number of independent researchers was the best way to capture the visual semblance of the collection of stars.[8] In 1920, he

6 Pannekoek 1897.

7 In a paper devoted entirely to the subject, Pannekoek (1912) identified many of the difficulties photography poses in the investigation of the structure of the galaxy. See also Omar W. Nasim's discussion of photography versus drawing in Nasim 2013, 229.

8 Pannekoek 1897, 398.

conducted a comparative analysis of existing representations of the Milky Way – including the work of such figures as German astronomer Otto Boeddicker (1853-1937), Dutch astronomer Cornelius Easton (1864-1929), and German astronomer Johann Friedrich Julius Schmidt (1825-1884) – in his publication *Die Nördliche Milchstrasse*. Significantly, the exploitation of variations in sense perception also played an important role in Pannekoek's observational methodology. By Pannekoek's estimation, for example, Boeddicker's drawings, although they were replete with stellar particularities, not only lacked a general sense of the Milky Way's overall distribution of light, but also suffered from poor lithographic reproduction; at the same time, he found the representation of particularities and distribution of light in Easton's and Schmidt's work rich by comparison.[9] Setting these images and verbal descriptions in relation to each other entailed making assessments of each astronomer's findings and modes of representation – a skilled practice that Pannekoek sought to systematize.[10]

As Pannekoek has written, even darkness opens up an enhanced means of viewing and seeing the Milky Way:

> In bright spots it is often advantageous to look at dark lanes, that divide them, and I have always found it best to look not exactly at the point that is being examined but somewhat above or at one side of it. By this indirect vision minute details appear, that are not visible when looked at directly.[11]

Indeed, as scientists later discovered, these dark voids in the sky – much of which results from the absorption, scattering, and polarization of visible light by particles and dust in the interstellar medium – can be tremendous sources of information. In the mid-twentieth century, as scholar Omar Nasim explains, the observations astronomers previously recorded by hand – particularly in drawings of galactic nebulae during the nineteenth century – were eclipsed by the investigation of 'nonvisible wavelengths'.[12]

9 Pannekoek 1920, 12.

10 Tai argues that Pannekoek's scientific persona resonated with what Lorraine Daston and Peter Galison have described as the epistemic virtue of 'trained judgement', which is predicated on a scientist's active and discerning assessment of the evidence at hand. As he writes (2017, 253), Pannekoek 'was part of a growing movement of scientists who increasingly emphasized the need for interpreted structure and systematized data. His ideal astronomer was actively involved in systematizing and analyzing the information provided by instruments or sense perceptions. His task was to recognize characteristic or distinguishing features of particularities and highlight them for other astronomers'. See also Daston and Galison 2007, 309-361.

11 Pannekoek 1897, 525-526.

12 Nasim 2013, 231.

Innumerable electromagnetic waves emanate from the darkness of the Milky Way, revealing the shrouding of light and energy at its centre. Largely impervious to interstellar extinction's distortions and diffusions, the emission of many other types of waves along the electromagnetic spectrum allow new stellar bodies to be 'seen', and even to 'speak'.

Voss's *Inverted Night Sky* exhibition also prospects such lacunae in areas further afield from the study of the distribution of light and stars in the Milky Way. Situated in between the dome projection and the series of panels at either end of the room lies an additional sound work entitled *Relativistic Working Time* (2016). Played back on a clear sound dome overhead, the track unifies the conceptual dynamic between the projection and the transparencies. Made in collaboration with artists Jessica Sehrt and Martin Stiehl – with whom Voss participates in the Realism Working Group, a young collective of activists, artists, and designers based in Frankfurt am Main – the audio reinterprets contemporary recordings of the electromagnetic emissions of selected neutron stars in the Milky Way. Remnants of collapsed massive stars, neutron stars appear to pulse due to the emission of electromagnetic radiation, like radio waves and visible light at their magnetic poles. Significantly, the orientation of the pulsar in relation to the observer (not necessarily confined to Earth but anywhere in the galaxy) determines how it is perceived; were it not for its movements, it would be hardly visible. Mediating between visually and instrumentally observable phenomena, its manipulated beats tick irregularly in critique of English mathematician and physicist Isaac Newton's conception of absolute time. The narrator on the adjacent projection dome's soundtrack paraphrases American sociologist and philosopher Lewis Mumford's 1934 *Technics and Civilization*, as if to echo the audio work's appeal to subjective knowledge and relativistic time: 'Life, instead, has regularities of its own, the beat of the pulse, the breathing of the lungs; these change from hour to hour depending on mood and action.'[13]

While idiosyncratic within astronomy and the natural sciences, Pannekoek's interest in the subjective nature of appearances is also more generally apparent in Voss's multimedia installations, in which historic

13 The original quote can be found in the section entitled 'The Monastery and the Clock' from the publication's first chapter: 'In terms of the human organism itself, mechanical time is even more foreign: while human life has regularities of its own, the beat of the pulse, the breathing of the lungs, these change from hour to hour with mood and action, and in the longer span of days, time is measured not by the calendar but by the events that occupy it'. See Mumford 1934, 15.

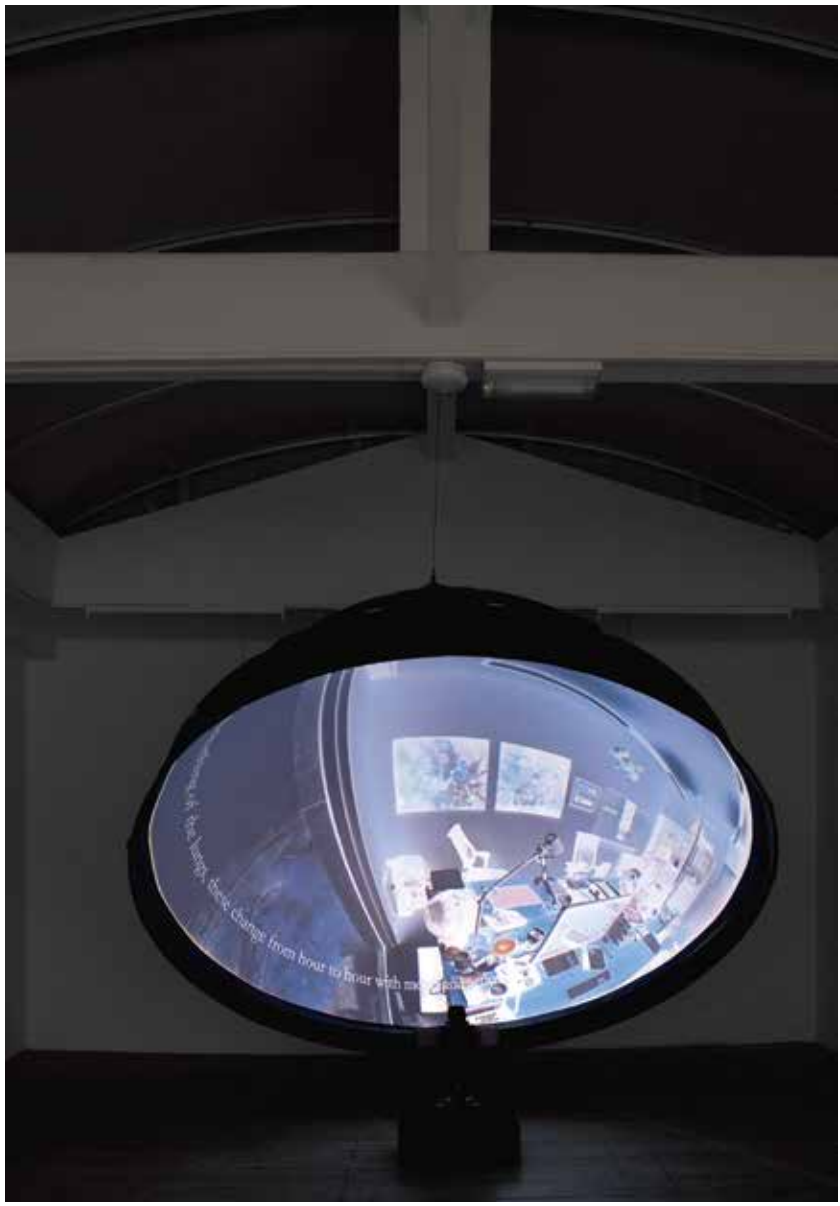
optical media confers agency to the viewer. In *Восстание рыбаков* (*Aufstand der Fischer*) (2011, see Figure 14.2), for example, Voss invokes the trope of the 'invisible hand', a metaphor found in the writings of the Scottish political economist Adam Smith, most famously in his 1776 *The Wealth of Nations*.[14] However, in Voss's case, the literal conjuring of a hand no longer represents the free markets, but a history that connects twentieth-century German author Anna Seghers with Erwin Piscator, a political theatre director of Weimar Germany. Piscator's theatre was produced in close rapport with workers – much like that of his contemporary, German playwright Bertolt Brecht. According to Brecht, 'workers judged everything according to the truth of its content; they welcomed every innovation which helped the representation of truth, of the real mechanism of society'.[15] This subjected all theatrical aesthetics to a realist baseline. To meet these new demands, Piscator sought to unmoor the illusionism of theatrical spectacle by way of photographic slides and film projections, which often documented street fights and mass demonstrations in Berlin.

The title of Voss's work refers to Seghers's 1928 novel *Revolt of the Fishermen of St Barbara*, in which fishermen in a rural, seaside town rise up against the market operations that set their wages. Crucially, the story is set without a coherent temporal or geographical specificity,[16] yet in 1934, Piscator completed a film adaption of Seghers's novella as an anti-fascist agitation against National Socialism. In *Aufstand der Fischer*, Voss restages Piscator's dramatic handling of Seghers's text as a scripted narrative, ultimately reflecting on the failure of the film adaptation's own agenda within the popular front against fascism. By way of an operational overhead projection device, Voss suggests that its disembodied female narrator is using the device in real time. As if by magic, her hands cast shadows on the wall as she moves through successive images. In actuality, the entire simulation of movement and presence is rigged up with a concealed digital projector. A similar effect takes place in Voss's *Phantascope* (*Light Archive*) (2013/2014), in which a digital projector surreptitiously imitates the slide projector's analogue techniques with stroboscopic images of historic examples of 1920s Berlin Dada photomontage intercut with present-day newspaper cutouts.

In both works, Voss makes use of the phantasmagoria – one of the most compelling and complex metaphors within Marxist thought for the

14 Smith 1776.
15 Brecht [1967] 2002, 83.
16 Schaub 2015.

Figure 14.2 Восстание рыбаков (Aufstand der Fischer) by Jeronimo Voss (2011)



Source: Oliver Ottenschlaeger/Secession Vienna (2013)

mendacious nature of capitalistic effects.[17] Popularized around the time of the French Revolution in the eighteenth century, the phantasmagoria itself was a technical apparatus predicated upon the artifice of theatre. A magic lantern – which could enlarge and project images painted or mounted onto glass slides by way of illumination – was hidden behind a translucent screen and mounted on wheels. Thus, its depicted figures – macabre, including ghosts, skeletons, and the like – were animated and took on lives of their own. For film scholar Tom Gunning, the epistemological implications of the phantasmagoria displays, which hinged upon the viewer's ability to distinguish between reality and illusion, and the uncanny interplay between them, remains one of the central concerns of modernism.[18] In his theatrical work, Piscator sought to empower individuals to free themselves of their passive relationship to the assumed 'benign' and 'benevolent' orchestrations of Smith's capitalist invisible hand by inverting the phantasmagoria's paradoxical simultaneity of illusion and reality. However, Seghers's original work already reflected the breakdown of the revolutionary project – as the narrator points out: 'On the very first page of her book she reveals that the revolt of the fishermen failed'.[19] Unwittingly, Piscator's film *Aufstand der Fischer*, which premiered in Moscow in October 1934, also reflected the nadir of epic theatre and related media arts' tactical efforts – as Voss's narrator concedes: 'By then, the Germans had long – and without any trace of revolt – decided for fascism.'

It is not inconsequential that Smith's first use of this metaphor appeared in one of the economist's early essays of natural philosophy entitled 'The History of Astronomy'.[20] Yet, the tendency found in Smith's work to develop connections between natural philosophy and social economy was neither

17 See 'The Fetishism of Commodities and the Secret Thereof' (section 4 of part 1, chapter 1) in Marx 1906, 83. As noted by scholars Tom Gunning and Margaret Cohen, the English translation inaccurately translates the German word 'phantasmagorische' (phantasmagoric) as 'fantastic'. See also Cohen 1989, 87-107 and Gunning 2005.

18 Referring to the aesthetic practices of modernity, Gunning (2005) writes, 'the [a]vant-[g]arde of the next century and a half [could be seen] as moving between these two poles – a direct and overwhelming address to the senses on the one hand, and the critique of illusion on the other.'

19 Voiceover transcription from Voss 2011.

20 Smith 1967, 30-109. Correlating Smith's notion of natural (economical and social) agency with that of the supernatural in the literary genre of the Gothic novel, scholar Stefan Andriopoulos (1999) argues that Smith's eventual 'inversion from "the invisible hand of Jupiter", disrupting the regular descent of heavy bodies' – as mentioned in his 'History of Astronomy' – to an impersonal 'invisible hand' in *The Wealth of Nations*, 'can be grasped as a naturalization of the supernatural'. Andriopoulos adds (1999, 753-754), 'Although Alec Macfie already drew attention to this first occurence [*sic*] of an "invisible hand" in Smith's writings [...], it has usually been ignored or dismissed as a "curious usage ... of ... limited interest" [...]'.

exclusive to his intellectual persona nor to his economic model of free markets. Socialist figures like Pannekoek and Blanqui, directed inferences to the night sky towards very different philosophical and epistemological ends. During the twentieth century's interwar period, Pannekoek was known, particularly within Germany, for his Marxist writings and his advocacy of council communism. While Blanqui sought to reconcile a theory of astronomical eternity with a revolutionary reality, Pannekoek compartmentalized the scientific and political intellectual threads of his work for much of his life. At periods which alternated with his major publications in the field of astronomy, Pannekoek argued in seminal socialist works, such as *Die taktischen Differenzen in der Arbeiterbewegung* (1909), for mass – as opposed to parliamentary – action, and in *De arbeidersraden* (1946), he meticulously delineated and critiqued a history of exploitative labour set against the backdrop of global geopolitics while promoting the establishment of workers' councils.[21] And yet, despite this division of his energies, 'Pannekoek's conception of the ideal scientist and the ideal Marxist were both rooted in the same epistemic concerns', as historian of science Chaokang Tai argues. To Pannekoek, 'the external world was a continuous and infinitely varied stream of events', of which the human cognition made sense.[22] In *L'éternité par les astres*, Blanqui grasps the methodological problem that gripped Pannekoek throughout this life – that of making sense of appearances and entities which escape or supercede perception. But just as Blanqui excavates political and social meaning from the limitations of vision, Pannekoek eschews statistical fact in favour of a kind of *collective visual speculation*.

Visualization, as we have seen, runs a wide spectrum of practices; and observation requires a sense of knowing and discerning phenomena. In contrast, aesthetic production is a generative process, which issues from the will and agency of the human subject. At the same time, it has also been long presumed (and ultimately encouraged) that works of art reflect an artist's subjectivity and individual point of view.[23] Above all, the sheer immensity of the Milky Way is a determining factor in wide dispersion of astronomers' observations of the night sky. This fact, in addition to the uniqueness and particularities of the subject, is what ultimately drove Pannekoek to his final thesis on its representation: 'The image of the Milky Way Galaxy that we observe is an optical phenomenon, whose materialization interacts with

21 Pannekoek 1909, 1946.

22 Tai 2017, 251.

23 See Daston and Galison's address of this topic in Daston and Galison 2007, 37.

different optical, physiological, and psychological conditions'.[24] However, instead of difference and discrepancy signifying failure, he set them into productive relation, generating new epistemological possibilities.

Jeronimo Voss prospects these illusions in his amplification of the aesthetic significance of technical media, like the phantasmagoria and the planetarium, which introduce new relations between the viewer's body and notions of transparency. In the curatorial statement of Voss's *Inverted Night Sky* exhibition in Amsterdam, the organizers equate Pannekoek's '"bottom-up" approach' towards making observations of the Milky Way Galaxy to 'his view that society ought to be structured by self-organized workers' councils, instead of being governed by state bureaucracy' and identifies this as a principal interest in the artist's project.[25] In a seeming deviation from conventional notions of scientific objectivity, Pannekoek collected and drew from these threads in order to generate an epistemology grounded in collective forms of knowledge production. Voss, too, is in search of new communal approaches towards contemporary society. Initiatives like Project Nika – in which he and his colleagues in the Realism Working Group seek to redevelop and recuperate abandoned commercial space in Frankfurt for a large communal space – signal his deep investments in the reconfiguration of the interrelation of living, engaging, and working.[26] These activities and the forms of interaction mobilized in the work cultivates the productive slippage between representation and a *material* reality that can be tactually manipulated and touched. Rather than merely rehabilitating media from the past, Voss comingles current techniques with (nearly) obsolete optical media in order to actualize a non-linear conception of time, which he infers from his reading of Blanqui's theoretical speculation of infinite worlds. If Pannekoek's work and life questioned the nature of perception and the conditions of collective participation, Voss's undertaking reassesses the socialist past by way of a politicized present.

24 Pannekoek 1920, 14. My translation.

25 SMBA 2016. This reading of his work echoes Tai's summation (2017, 249): '[Pannekoek's] bottom-up conception of the ideal society is reminiscent of the bottom-up method he applied in sidereal astronomy, where individual stars congregated into clusters and the combination of clusters formed the Milky Way Galaxy.'

26 Deutsch 2017. Previous living concepts conceptualized by members of this group were exhibited as part of *Wohnungsfrage* – a group exhibition, publication series, and academy on the contemporary status of housing and its relationship to various artist and housing initiatives and international architectural firms – held at the Haus der Kulturen der Welt in Berlin from 23 October – 14 December 2015. It included a shoptalk and panel discussion with the Realism Working Group and Florian Schmidt, Studio Commissioner of Berlin, held on 30 October 2015, entitled 'Art Studio – Studio Living' on new conceptions of the relationship between artists' living and working spaces.

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About the Author

Alena J. Williams is Assistant Professor of Film/Media History and Theory in the Department of Visual Arts at the University of California, San Diego. Her research areas include nineteenth- and twentieth-century technology and visual culture; theories of modernity, and the epistemology of the image. She is currently preparing a book-length study, *The Total Experiment: Cinema and the Modernist Work of Art*, which examines the way in which 'knowledge-making' and 'world-making' practices in astronomy converged with experimental cinema during the long twentieth century.