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Anton Pannekoek, Marxist astronomer

Photography, epistemic virtues, and political philosophy in early twentieth-century astronomy

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Publication date

2021

[Link to publication](#)

Citation for published version (APA):

Tai, C. K. (2021). *Anton Pannekoek, Marxist astronomer: Photography, epistemic virtues, and political philosophy in early twentieth-century astronomy*. [Thesis, fully internal, Universiteit van Amsterdam].

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Verbal Descriptions of the Milky Way

The following is an extract from Pannekoek's *Die nördliche Milchstrasse* (pp. 66–67). It gives a verbal description of the mean subjective image of a small section of the Northern Milky Way. This is created by combining descriptions from direct visual observations for some observations with descriptions of features seen in the drawings of others. The names indicate who made the observations. All these descriptions cover the same part of the Milky Way where the constellations Camelopardalis, Lynx, and Auriga meet.

Pannekoek:

§ 51. In these areas, between 10 H and 10 Camelopardali, where the triangle of light reaching towards γ Persei also connects with the northern stream, the column becomes unnoticeable and bright patches from ϵ and ι Cassiopeiae come together. ²¹⁾ They become gradually fainter e[ast]ward and run in a wide weak stream from 10 – 11 over 31 Camelopardali towards the stars in the head of Lynx. On clear nights this light can be followed as a faint offshoot up to the head of the great bear. Towards the s[outh]e[ast] the light goes from 10 Camelopardali over δ Aurigae, while getting gradually brighter, towards β Aurigae ²²⁾; a dark area α – β Aurigae separates this stream from the mainstream.

Easton:

²¹⁾ With E[aston] the column remains visible, past the brightening 1 H–7 H it becomes darker again (E. XXXIII) and extends itself past 10 and 11 Camelopardali to a dark area between δ – α – β Aurigae.

²²⁾ E[aston] 122, narrow stripes 11 Camelopardali – δ –41 Aurigae, come through in the stream from 18 Lyncis towards β Aurigae. Everything is very faint, therefore the is[ophotic] m[ap] is hardly indicated.

Schmidt:

§ 51. In the border areas only a few spots are visible: from 9 to 10–11 Camelopardali an isolated distinctly elongated spot (on I; On II the stars lay on the faint border of light), around 2 Lyncis a round spot on I, and n[orth] of 1 Lyncis a faint glimmer on II. A narrow light-stripe starts at ξ – δ Aurigae and goes on towards β Aurigae

Boeddicker:

§ 51. A hardly noticeable light-stripe goes from 9 over 17 to 31 Camelopardali – 2–12–15 Lyncis. A second, very faint, bendy light-stripe goes on as continuation of the strip that comes from B.A.C. 1470 from 10–11 Camelopardali e[ast] of ξ – δ Aurigae along to β Aurigae

Backhouse:

§ 51. Ba[ckhouse]. A broad faint band of light comes out of the Milky Way at β Cephei and rejoins it at 2 Lyncis. It encloses a dark region 50 Cassiopeia – 1H–10–5H Camelopardali. A sidestream emanates from it at 5H–19H Camelopardi towards 43H Cephei – ξ Cephei; the North Star still lays just in the dark. The outermost border of the Milky Way light goes over $\frac{3}{4}$ (31 Lyncis – ι Ursae) – o Ursae – 22 Ursae.

Pannekoek's Astronomy Students

During Pannekoek's time the director of the Astronomical Institute in Amsterdam, a number of students studied astronomy there as their main subject. The following is a list of the students who went on to obtain a doctoral degree in astronomy, whether in Amsterdam or elsewhere, sorted by their date of graduation.¹

Jacobus Josephus Maria Reesinck (1902–1984) Reesinck was the first PhD student to study astronomy at Amsterdam. His doctoral research combined observational measurements and theoretical calculations on the period variation of δ Cephei.²

Nicolaas Wilhelmus Doorn (1901–1955) When Doorn was an astronomy student in Leiden, he joined Pannekoek and Marcel Minnaert as part of the 1927 Solar eclipse expedition to Gällivare. He finished his doctoral research at the University of Amsterdam in 1929 with a thesis based on the photographic plates of the chromosphere taken during that expedition.³

1. For the entire list, the dates of birth and death are taken from the Album Academicum of the University of Amsterdam: albumacademicum.uva.nl.

2. J. J. M. Reesinck, *Onderzoekingen over Delta Cephei en over het Cepheidenprobleem*, PhD Thesis, University of Amsterdam (Amsterdam: H.J. Paris, 1926).

3. N. W. Doorn, *Absolute intensiteitsmetingen in het spectrum van chromosfeer en corona der zon, gedurende de totale verduistering op 29 juni 1927*, PhD Thesis, University of Amsterdam (Amsterdam: H.J. Paris, 1929).

Sijtze Verweij (1894–1979) Verweij graduated in 1936 with a PhD thesis on theoretical computations of the Stark effect in hydrogen lines.⁴

Gijsbert van Herk (1907–1999) Van Herk studied astronomy in Amsterdam where he finished in 1930 with a master's thesis on the photographic photometry of the Magellanic Clouds.⁵ He obtained his doctoral degree in 1936 in Leiden, where he remained the rest of his career. Up until 1957, one of his main tasks there was to observe with the meridian circle that had once been used by Pannekoek.⁶

Gale Bruno van Albada (1912–1972) Before the start of the Second World War, Van Albada measured the equivalent widths of several stars ranging from A to G-type. Anton Pannekoek and Gale Bruno van Albada, *A Photometric Study of Some Stellar Spectra (δ Cephei, ζ Cygni, π Cephei, δ Equulei): Part 1. Catalogue of Line Intensities*, Publications of the Astronomical Institute of the University of Amsterdam 6, pt. 1 (Amsterdam: Stadsdrukkerij, 1939). These measurements formed the basis of his PhD thesis, for which he constructed curves of growth and analysed the physical conditions of those stars.⁷ He was director of Bosscha Observatory in Leiden from 1949 to 1958, where he married Elsa van Dien in 1950 (his second marriage), and director of the Astronomical Institute in Amsterdam from 1959 to 1972.⁸ He was also an active member of the council communist movement.⁹

4. Sijtze Verweij, *The Stark Effect of Hydrogen in Stellar Spectra*, Publications of the Astronomical Institute of the University of Amsterdam 5 (Amsterdam: Boek-, Kunst- en Handelsdrukkerij, 1936).

5. Gijsbert van Herk, 'Photographic Photometry of the Magellanic Clouds', *Bulletin of the Astronomical Institutes of the Netherlands* 6, no. 209 (1930): 61–64.

6. Harm J. Habing, 'Gijsbert van Herk, 1907–1999', *Bulletin of the American Astronomical Society* 32, no. 4 (2000): 1689–1690.

7. Gale Bruno van Albada, 'Een onderzoek van lijnintensiteiten in eenige sterspectra van het tweede type' (PhD Thesis, University of Amsterdam, 1945), later published as Anton Pannekoek and Gale Bruno van Albada, *A Photometric Study of Some Stellar Spectra (δ Cephei, ζ Cygni, π Cephei, δ Equulei): Part 2. Discussion of the Results*, Publications of the Astronomical Institute of the University of Amsterdam 6, pt. 2 (Amsterdam: Stadsdrukkerij, 1946).

8. Léo Houziaux, 'Van Albada, Gale Bruno', in *Biographical Encyclopedia of Astronomers*, ed. Thomas Hockey, vol. 2, 2207 (New York: Springer, 2014).

9. Philippe Bourrinet, *The Dutch and German Communist Left (1900–68): 'Neither Lenin nor Trotsky nor Stalin!'; 'All Workers Must Think for Themselves!'* (Leiden: Brill, 2017), 290 n 29, 465–498 *passim*.

Elsa van Dien (1914–2007) As an astronomy student in Amsterdam, Van Dien investigated the limb darkening in YZ Cassiopeiae, which led to an early publication.¹⁰ She was awarded a scholarship to finish her doctoral research at Radcliffe College in 1939 but had to go into hiding during the Second World War.¹¹ She finally went after the war ended and graduated in 1948 with a thesis on the Stark effect in Balmer lines; the topic had been suggested by Pannekoek.¹² She spent two years at Dominion Astrophysical Observatory in Victoria, BC before moving to Bosscha Observatory. She married Bruno van Albada in 1950, after which she stopped publishing research. She returned to Amsterdam in 1958 where she published a few papers in the 1980s and 1990s.¹³

Théodore ‘Fjeda’ Walraven (1916–2008) Walraven worked on the photometry of γ Cassiopeiae as a student in Amsterdam before the Second World War. David Koelbloed and Théodore Walraven, ‘Some Observations of the Spectrum of γ Cassiopeiae’, *Bulletin of the Astronomical Institutes of the Netherlands* 8, no. 314 (1938): 299–304. He graduated in 1948 with a doctoral thesis on the variation of δ Cephei based on his measurements of photographic plates taken at the Dominion Astrophysical Observatory by Pannekoek. His thesis was supervised by Pannekoek and approved by Herman Zanstra.¹⁴ He began working at Leiden Observatory in 1946, where he retired as Professor of Astronomy in 1980.¹⁵

Johan Weenen (1916–2005) Weenen graduated in 1949 with a PhD thesis on theoretical calculations of the structure of Wolf-Rayet stars. He wrote the first part of his thesis before the Second World War super-

10. Anton Pannekoek and Elsa van Dien, ‘Limb Darkening in the Eclipsing Variable 21 Cassiopeiae’, *Bulletin of the Astronomical Institutes of the Netherlands* 8, no. 297 (1937): 141–148.

11. Joan McPartlin, ‘Dutch Underground Distributes Forged Ration Books and Papers’, *Radcliffe News*, 16 November 1945, 2.

12. Elsa van Dien, ‘The Stark-Effect of the Higher Balmer Lines in Stars of Spectral Types A and B’ (PhD Thesis, Radcliffe College, Cambridge, MA, 1948).

13. Leo Molenaar, ‘Wij kunnen het niet langer aan de politici overlaten’: *De geschiedenis van het Verbond van Wetenschappelijke Onderzoekers, 1946–1980* (Rijswijk: Elmar, 1994), 276–280.

14. Théodore Walraven, *The Line Spectrum of δ Cephei*, Publications of the Astronomical Institute of the University of Amsterdam 8 (Amsterdam: Stadsdrukkerij, 1948).

15. Virginia Trimble, ‘Walraven, Theodore (“Fjeda”)', in *Biographical Encyclopedia of Astronomers*, ed. Thomas Hockey, vol. 2, 2286 (New York: Springer, 2014).

vised by Pannekoek and finished the second part after the war supervised by Herman Zanstra.¹⁶

David Koelbloed (1905–1977) At the age of 16, Koelbloed was hired as computer at the newly-founded Astronomical Institute in Amsterdam. He assisted Pannekoek in his Milky Way and statistical research and was co-author in the publication of the photographic photometry of the southern Milky Way.¹⁷ He also assisted many of Pannekoek's students. He started following astronomy classes and obtained his master's degree in 1948 and eventually graduated in 1953 on a doctoral thesis on the line spectra of K-stars.¹⁸ He was lecturer of astronomy in Amsterdam from 1963 to 1974.

16. Johan Weenen, 'Over Be-sterren en de bouw en samenstelling van Wolf-Rayet-Sterren' (PhD Thesis, University of Amsterdam, 1949).

17. Anton Pannekoek and David Koelbloed, *Photographic Photometry of the Southern Milky Way*, Publications of the Astronomical Institute of the University of Amsterdam 9 (Amsterdam: Stadsdrukkerij, 1949).

18. David Koelbloed, *Line Spectra of Some Giant and Dwarf K-Type Stars*, Publications of the Astronomical Institute of the University of Amsterdam 10 (Amsterdam: Wed. G. van Soest, 1953).