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Anatoly Vlasov heritage: 60-year-old controversy

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Abstract

We analyzed remarkable stories linked to the famous Anatoly Vlasov equations in plasma physics. Their creation, modification, and application are interesting from the scientific viewpoint. We also show the relations between those equations dealing with electromagnetism and analogous Jeans equations describing, in particular, gravitational instability in astrophysics. The second half of the essay is devoted to the controversies and political struggle in Soviet (before 1991) and Russian (after 1991) physical communities related to Vlasov's personality, career, and posthumous recognition. The never-ending destructive influence of the Russian totalitarianism on science is demonstrated.

Notes

1. Ukrainian experimentalist Komnik (A. G. heard his regrets personally) excluded some strange original results from his book describing electrical conductivity of thin metallic films [154]. However, the excluded logarithmic temperature dependencies correspond to genuine quantum mechanical interference effects and were discovered theoretically somewhat later [4, 15].

2. Biography of Anatoliy Vlasov can be found in [30].

3. Recall the name of the continent in the Western Hemisphere.

4. Lord Rayleigh [187] obtained the same plasma frequency while analyzing the properties of the J. J. Thomson plum pudding model atom [255]. Namely, Lord Rayleigh assumed that positive and negative entities in an atom are equal in all respects accept the ability to move: negative charges were considered mobile. It is exactly the behavior of light electrons against heavy ions in gas-discharge and metal plasmas.

5. According to Earnshaw's theorem, even quasi-neutrality would not ensure the stability of classical macroscopic systems [75]. Nevertheless, the situation in the quantum mechanical and relativistic world is different. If one considers corresponding complications, the problem of matter stability becomes much more involved [178].

6. To formulate self-consistent kinetic equations without collisions (the Boltzmann-like equations without the Stoß term, which is responsible for collisions) but for any long-range field, one can follow Vlasov's way of treating electromagnetic interaction. However, to call them Vlasov–Newton, Vlasov–Einstein, and Vlasov–Maxwell equations [262] reflects the imperial hubris and misinterpreted patriotism. Such equations were first proposed to describe the evolution of a collective of stars in the Newtonian universe, whereas the long-range field was represented by the gravitational potential. It was done by the eminent British physicist and astronomer James Jeans, who applied the Boltzmann approach considering stars as particles [127, 140, 141].

7. Ginzburg et al. [105]; hereafter, for the sake of brevity, we shall refer to the authors as a "gang of four," similarly to the authors of the famous highly cited article by Abrahams et al. [4] devoted to

the weal localization in two-dimensional disordered systems that was so coined later on [3, 165].

8. An overview of the problem of Landau damping in plasma physics and astrophysics can be found in [34, 204, 231].

9. Vlasov wanted to bypass the calculation of the Gibbs partition function, from which one can find all the thermodynamic functions of the system. If his approximation had worked, it would have been a great success, since calculation of the partition function is always difficult and, in most cases, impossible. However, Vlasov failed. For example, the gang of four [105, p. 249] pointed out that, according to Vlasov theory, the period of the crystal lattice should strongly depend on temperature, which contradicts the experiment and discredits the theory within which this result was obtained.

10. The adiabatic (Laplacian) and isothermal (Newtonian) speeds of sound are related as $(c_{\text{p}}/c_{\text{v}})^{1/2}$, where c_{p} and c_{v} are gas specific heat capacities at constant pressure and volume, respectively [170]. Naturally, this ratio depends on the parameters of a particular substance, but for real gases, the order of magnitude of the speed of sound remains the same whatever the process of sound propagation [168, 225].

11. See, e. g., [170, p. 3]. In essence, Euler’s equation is a formulation of Newton’s second law for the fluid motion [10]. The biography of the great Swiss mathematician Leonhard Euler and the analysis of his differential equations can be found in [226, 254].

12. For the Jeans instability in the quasi-static Einstein–de Sitter model, see: [49, 55, pp. 174–178; 148, p. 146]. Studies of instabilities in the Friedmann–Lemaître model are discussed, in particular, in [55, pp. 178–184; 113, pp. 13–20; 118, 179, 180, 181, 279, pp. 285–309].

13. The inevitability of classical and quantum fluctuations and their important role against the background of average statistical (thermodynamic) characteristics of systems have long been known and are being widely studied now, in particular, in magnetic, superconducting, and ferroelectric materials, where, apart from the crystalline order, additional order parameters are observed with the loss of some symmetry. Of course, fluctuations

there can be “touched,” if not by experimentalists themselves then at least with the help of simple devices. This distinguishes these “terrestrial” fluctuations favorably from theoretically assumed fluctuations in astrophysics, which are discussed here. One can read about fluctuations in plasma, condensed media, and devices in Refs. [108, 134, 168, 173, 197, 200, 211, 220, 244].

14. The first attempts to overcome the inadequacy of the Newtonian theory to describe a spatially unlimited Universe uniformly filled with matter (“gravitational paradox”) belong to the outstanding German scientists Hugo von Seeliger and Carl Neumann [160, p. 53; 212, pp. 271–323; 213, pp. 65–71].

15. The history of physics should include a description in terms of attributes and their carriers [96].

16. Hideki Yukawa was a renowned Japanese researcher who made contributions to nuclear physics and field theory [194, 277].

17. This problem was analyzed in detail but much later [9, 17, 51, 74, 85, 202, 206, 248, 249].

18. Actually, Marxist in form, but meaningless in content, mumbling of Marxist philosophers (it would be more valid to add the prefix “pseudo”) easily turns into religious fundamentalism (which has nothing in common with the Christian theology of civilized Europe). For instance, such a metamorphosis occurred with the French revolutionary Roger Garaudy, who from a devoted Marxist became an Islamic fundamentalist and a professional outspoken anti-Semite [98].

19. Anyway, those points, which were criticized by the gang of four, were not touched upon in the Bogolyubov monograph [41], so the Rukhadze attempt to rely on Bogolyubov’s authority is not justified.

20. Ginzburg [102] quite frankly notes that the main trigger causing the appearance of the gang-of-four article was the role of Vlasov as the banner of the communist establishment of Moscow State University, which hunted physics and physicists and prepared the destruction of physics in the style of the destruction of genetics by the notorious academician Trofim Lysenko. If Vlasov’s dangerous public role had not been so evident, his mistakes would hardly have been noticed. At the same time,

from the scientific viewpoint, as Ginzburg writes, the article of four authors was flawless. However, the crushing tone of the academicians' article induced such emotions that it also cast doubt on the main results of Vlasov's 1938 article, which were and are of great scientific importance. Still, the gang of four did not know (or forgot) about the priority of Jeans regarding the self-consistent field, so Vlasov managed to avoid criticism in this respect then and throughout his later life.

21. Vladimir Moiseevich Agranovich is a well-known Ukrainian and Russian physicist. Since the 1990s, he has been working in the West; https://ru.wikipedia.org/wiki/Агранович,_Владимир_Моисеевич.

References

1. Abbott, B. P. et al. 2016. Observation of gravitational waves from a binary black hole merger. Phys. Rev. Lett. **116** (6): 061102

2. Ablowitz, M. J. and A. S. Fokas. 2003. Complex Variables. Introduction and Applications. 2nd ed. Cambridge University Press, Cambridge

3. Abrahams, E. Ed. 2010. 50 Years of Anderson Localization. World Scientific, Singapore.

4. Abrahams, E., P. W. Anderson, D. C. Licciardello, and T. V. Ramakrishnan. 1979. Scaling theory of localization: absence of quantum diffusion in two dimensions. Phys. Rev. Lett. **42** (10): 673-676

5. Academy of Sciences of the USSR. Academy of Medical Sciences of the USSR. Scientific Session Dedicated to the Problems of the Physiological Doctrine of Academician I. P. Pavlov. June 28 – July 4 – 1950. AN SSSR, Moscow-Leningrad (In Russian)

6. Afanasiev, G. N. 2004. Vavilov-Cherenkov and Synchrotron Radiation. Foundations and Applications. Springer, New York

7. Akhiezer A. I. Ed. 1974. Plasma Electrodynamics. Nauka, Moscow (In Russian)

8. Akhiezer, A. I., I. A. Akhiezer, and R. V. Polovin. 1967. Collective Oscillations in a Plasma. Cambridge MIT Press, Cambridge, MA

9. Akhundov M. D. and L. B. Bazhenov. 1989. At the origins of ideologized science. Priroda (Nature) N2: 90-99 (In Russian)

10. Alam, M-R. 2021. Why does water shoot higher if we partially block the garden hose outlet? Amer. J. Phys. **89** (6): 567-574

11. Aleksandrov, A. F., L. S. Bogdankevich, A. A. Rukhadze. 1990. Oscillations and Waves in Plasma Media. Moscow University Press, Moscow (In Russian)

12. Aleksandrov, A. F. and A. A. Rukhadze. 1997. On the history of fundamental papers on the kinetic plasma theory. Plasma Phys. Rep. **23** (5): 442-447

13. Allen, B. 2019. The Nobel lectures on gravitational waves and LIGO. Ann. Phys. (Berlin) **531** (1): 1800442

14. Allen, J. E. and A. D. R. Phelps. 1977. Waves and microinstabilities in plasmas – linear effects. Rep. Prog. Phys. **40** (11): 1305-1368

15. Altshuler, B. L., A. G. Aronov, and P. A. Lee. 1980. Interaction effects in disordered Fermi systems in two dimensions. Phys. Rev. Lett. **44** (19): 1288-1291

16. Anderson, P. W. 2011. More and Different. Notes from a Thoughtful Curmudgeon. World Scientific, Singapore

17. Andreev, A. V. 2000. Physicists Do Not Joke. Pages of the Social History of the Research Institute of Physics at Moscow State University (1922–1954). Progress-Tradition, Moscow (in Russian)

18. Annett, J. F. 2004. Superconductivity, Superfluids and Condensates. Oxford University Press, Oxford

19. Askerov, B. M. and S. R. Figarova. 2010. Thermodynamics. Gibbs Method and Statistical Physics of Electron Gases. Springer, Berlin

20. Backus, G. 1960. Linearized plasma oscillations in arbitrary electron velocity distributions. J. Math. Phys. **1** (3): 178-191

21. Baggott, J. 2020a. Quantum Reality. The Quest for the Real Meaning of Quantum Mechanics – a Game of Theories. Oxford University Press, Oxford

22. Baggott, J. 2020b. The Quantum Cookbook. Mathematical Recipes for the Foundations of Quantum Mechanics. Oxford University Press, Oxford

23. Balescu, R. 1960. Irreversible processes in ionized gases. Phys. Fluids **3** (1): 52-63

24. Balescu, R. 1963 Statistical Mechanics of Charged Particles. Interscience, New York

25. Ball, P. 2016. No result, no problem? Phys. World **29** (5): 38-41

26. Bardeen, J., L. N. Cooper, and J. R. Schrieffer. 1957. Theory of superconductivity. Phys. Rev. 108 (5): 1175-1204

27. Bardeen, J. and W. Shockley. 1950. Energy bands and mobilities in monatomic semiconductors. Phys. Rev. **80** (1): 72-80

28. Barish, B. 2019. LIGO and gravitational Waves, II: Nobel lecture, December 8, 2017. Ann. Phys. (Berlin). **531** (1): 1800357

29. Barry, J. D. 1980. Ball Lightning and Bead Lightning. Extreme Forms of Atmospheric Electricity. Springer, New York

30. Bazarov I. P. and P. N. Nikolaev. 1999. Anatoliy Aleksandrovich Vlasov. Physical Department of the Moscow State University, Moscow (In Russian)

31. Berg A. I. and M. I. Radovskiy. 1945. Aleksandr Stepanovich Popov. Gosenergoizdat, Moscow (In Russian)

32. Bergmann, P. G. 1976. Introduction to the Theory of Relativity. Dover Publications, New York

33. Bernstein, B., Greene, J. M. and M. D. Kruskal. 1957. Exact nonlinear plasma oscillations. Phys. Rev. **108** (3): 546-550

34. Bertrand, P., D. Del Sarto and A. Ghizzo. 2019. The Vlasov equation 1. History and General Properties. ISTE Ltd, London

35. Berz, F. 1956. On the theory of plasma waves. Proc. Phys. Soc. B **69** (9): 939-952

36. Bilukha, Yu. Ed. 1999. Deported Crimean Tatars, Bulgarians, Armenians, Greeks, Germans. Collection of Documents of the Autonomous Republic of Crimea (1989–1999). Abris, Kyiv (In Ukrainian)

37. Binney, J. and S. Tremaine. 2008. Galactic Dynamics. Princeton University Press, Princeton

38. Bisnovatyi-Kogan, G. S. 2011. Stellar Physics. 2. Stellar Evolution and Stability. Springer, Berlin

39. Blokh, A. M. 2005. The Soviet Union in the Interior of Nobel Prizes. Data. Documents. Reflections. Comments. Second Revised and Enlarged Edition. Fizmatlit, Moscow (In Russian)

40. Boerner, H. 2019. Ball Lightning. A Popular Guide to a Longstanding Mystery in Atmospheric Electricity. Springer, Cham

41. Bogolyubov, N. N. 1946. Problems of Dynamic Theory in Statistical Physics. OGIZ, State Publishing House of Technical and Theoretical Literature, Moscow-Leningrad (In Russian)

42. Bohenski, J. M. 1963. Soviet Russian Dialectical Materialism [Diamat]. Reidel, Dordrecht

43. Bohm, D. and E. P. Gross. 1949a. Theory of plasma oscillations. A. Origin of medium-like behavior. Phys. Rev. **75** (12): 1851-1864

44. Bohm, D. and E. P. Gross. 1949b. Theory of plasma oscillations. B. Excitation and damping of oscillations. Phys. Rev. **75** (12): 1864-1876

45. Boltzmann, L. 1897. Vorlesungen über die Principien der Mechanik. I. Teil. Verlag von Johann Ambrosius Barth, Leipzig (In German)

46. Boltzmann, L. 1904. Vorlesungen über die Principien der Mechanik. II. Teil. Verlag von Johann Ambrosius Barth, Leipzig (In German)

47. Bondi, H. 1960. Cosmology. Cambridge University Press, Cambridge, p. 80

48. Bonnor, W. B. 1957. Jeans' formula for gravitational instability. Monthly Notices Roy. Astron. Soc. **117** (1): 104-117

49. Börner, G. 2003. The Early Universe. Facts and Fiction. Springer, Berlin

50. Brodin, G. 1997. A new approach to linear Landau damping. Amer. J. Phys. **65** (1): 66-74

51. Brudny, Y. M. 1999. Reinventing Russia. Russian Nationalism and the Soviet State, 1953-1991. Harvard University Press, Cambridge, MA

52. Brush, S. G. and N. S. Hall. 2003. The Kinetic Theory of Gases. An Anthology of Classic Papers with Historical Commentary. Imperial College Press, London

53. Burgin, M. S. and O. M. Gabovich. 1997. Why the discovery was not made? Herald of the NASU, N 3-4, p. 55-60 (In Ukrainian)

54. Burke, W. L. 1980. Spacetime, Geometry, Cosmology. University Science Books, Mill Valley, CA

55. Byrd, G. G., Chernin, A. D. and M. J. Valtonen. 2007. Cosmology: Foundations and Frontiers. URSS, Moscow

56. Case, K. M. 1959. Plasma Oscillations. Ann. Phys. **7** (3): 349-364

57. Chadwick, J. 1932a. Possible existence of a neutron. Nature **129** (3252): 312

58. Chadwick, J. 1932b. The existence of a neutron. Proc. R. Soc. Lond. A **136** (830): 692-708

59. Chen, F. F. 2015. Introduction to Plasma Physics and Controlled Fusion. Third Edition. Springer, Cham

60. Cheremnykh, N. A. and I. F. Shipilov. 1955. A. F. Mozhaiskiy – Creator of the World's First Aircraft. Military Publishing House of the USSR Ministry of Defense, Moscow (In Russian)

61. Clarke, C. and B. Carswell. 2007. Principles of Astrophysical Fluid Dynamics. Cambridge University Press, Cambridge

62. Clemmow, P. C. and J. P. Dougherty. 1990. Electrodynamics of Particles and Plasmas. CRC Press, Boca Raton

63. Clemmow, P. C. and A. J. Willson. 1956. The dispersion equation in plasma oscillations. Proc. R. Soc. Lond. A **237** (1208): 117-131

64. Cooray, V. 2015. An Introduction to Lightning. Springer, Dordrecht

65. Corry, L., J. Renn, and J. Stachel. 1997. Belated decision in the Hilbert-Einstein priority dispute. Science **278** (5341): 1270-1273

66. Cyrot, M. 1973. Ginzburg-Landau theory for superconductors. Rep. Prog. Phys. **36** (2): 103-158

67. Danilevskiy, V. V. 1947. Russian Technology. Leningrad Newspaper, Magazine and Book Publishing House, Leningrad (In Russian)

68. Dawson, J. 1961. On Landau damping. Phys. Fluids **4** (7): 869-874

69. Dawson, J. 1962. One-dimensional plasma model. Phys. Fluids **5** (4): 445-459

70. Debye, P. and E. Hückel. 1923. Zur Theorie der Elektrolyte. Gefrierpunktserniedrigung und verwandte Erscheinungen. Physik. Ztschr. **24**: 185-206 (In German)

71. Degen I. 2014. Compared to 1913. Notes on Jewish History N 2 (172) (In Russian)

72. De Sitter, W. 1917. On Einstein's theory of gravitation and its astronomical consequences. Third paper. Month. Notices Roy. Astron. Soc. **78** (1): 3-28

73. Dieterich, W., P. Fulde, and I. Peschel. 1980. Theoretical models for superionic conductors. Adv. Phys. **29** (3): 527-605

74. Dunlop, J. B. 1983. The Faces of Contemporary Russian Nationalism. Princeton University Press, Princeton, NJ

75. Earnshaw, S. 1842. On the nature of the molecular forces which regulate the constitution of the luminiferous ether. Transact.

Cambridge Philosoph. Soc. 7: 97-112

76. Eckstein, M. and P. Horodecki. 2022. The experiment paradox in physics. Found. Sci. **27** (1): 1-15

77. Eddington, A. 1933. The Expanding Universe. Cambridge University Press, Cambridge, P. 23-24

78. Einstein, A. 1905. Zur Elektrodynamik bewegter Körper. Annalen der Physik 4 (17): 891-921 (In German)

79. Einstein, A. 1915. Die Feldgleichungen der Gravitation. Sitzungsber. Preuss. Akad. Wiss. 48 (2): 844-847 (In German)

80. Einstein, A. 1917. Kosmologische Betrachtungen zur allgemeinen Relativitätstheorie. Sitzungsber. Preuss. Akad. Wiss. 1:142-152 (In German)

81. Einstein, A. and L. Infeld. 1967. Evolution of Physics. The Scientific Book Club, London.

82. Eisenberg, J. M. and W. Greiner. 1975. Nuclear Theory. Volume1. Nuclear Models. North Holland, Amsterdam

83. Elskens, Y. and D. Escande. 2003. Microscopic Dynamics of Plasmas and Chaos. Institute of Physics Publishing, Bristol

84. Enserink, M. 2008. Dutch universities split over Nobel laureate's rehabilitation. Science **319** (5862) 401

85. Esakov, V. D. and E. S. Levina. 2005. Stalin's Courts of Honor. KR Case. Nauka, Moscow (In Russian)

86. Farrell, J. 2005. The Day Without Yesterday. Lemaître, Einstein and the Birth of Modern Cosmology. Basic Books, New York

87. Ferngren, G. B. Ed. 2000. The History of Science and Religion in the Western Tradition. An Encyclopedia. Garland, New York

88. Fikhtengoltz, G. M. 1963. Course in Differential and Integral Calculus, Volume 3, Third Edition. Fizmatgiz, Moscow (In Russian)

89. Flores-Livas, J. A., L. Boeri, A. Sanna, G. Profeta, R. Arita, and M. Eremets. 2020. A perspective on conventional high-temperature superconductors at high pressure: Methods and materials. Phys. Rep. **856**, P. 1-78

90. Frazer J. G. 2009. The Golden Bough. A Study of Magic and Religion. The Floating Press, Auckland

91. Freire, Jr., O. 2015. The Quantum Dissidents. Rebuilding the Foundations of Quantum Mechanics (1950-1990). Springer, Berlin

92. Friedman, A. 1999. On the curvature of space. Gen. Relativ. Gravit. **31** (12) 1991-2000

93. Friedmann, A. 1999. On the possibility of a world with constant negative curvature of space. Gen. Relativ. Gravit. **31** (12) 2001-2008

94. Gabovich, A. M. and V. I. Kuznetsov. 2013. What do we mean when using the acronym 'BCS'? The Bardeen–Cooper–Schrieffer theory of superconductivity. Eur. J. Phys. **34** (2): 371-382

95. Gabovich, A. and V. Kuznetsov. 2019. Towards periodizations of science in the history of science. In: Conference Book of Proceedings of 15th International Conference “History, Philosophy, and Science Teaching”, Re-Introducing Science: Sculpting the Image of Science for Education and Media in Its Historical and Philosophical Background, Thessaloniki, Greece, July 15th- July 19th, 2019. P. 585–594

96. Gabovich, A. and V. Kuznetsov. 2022. Path of modern natural sciences: from discovery of realities to study of their attributes.

Studies in History and Philosophy of Science and Technology, **31**(2): 3-15. https://doi.org/10.15421/272214

97. Gamow, G. and E. Teller 1939. On the origin of great nebulae. Phys. Rev. **55** (7): 654-657

98. Garaudy, R. 1994. Verheißung im Islam. SKD Bavaria, Munich (In German)

99. Gibbs, J. W. 1928. The Collected Works of J. Willard Gibbs in Two Volumes. Volume 2 Elementary Principles in Statistical Mechanics. Dynamics. Vector Analysis and Multiple Algebra. Electromagnetic Theory of Light etc. Longmans, Green and Co, New York

100. Ginzburg, V. L. 1967. Propagation of Electromagnetic Waves in Plasma, Second Revised Edition. Nauka, Moscow (In Russian)

101. Ginzburg, V. L. 1989. Applications of Electrodynamics in Theoretical Physics and Astrophysics. Gordon and Breach Science Publishers, New York

102. Ginzburg, V. L. 2000. About some pseudo-historians of physics. Issues Hist. Natural Sci. Technol. N 4: 5-14 (In Russian)

103. Ginzburg, V. L. 2004. Nobel Lecture: On superconductivity and superfluidity (what I have and have not managed to do) as well as on the “physical minimum” at the beginning of the XXI century. Rev. Mod. Phys. **76** (3): 981-998

104. Ginzburg, V. L. and L. D. Landau. 1950. On the theory of superconductivity. Zh. Eksp. Teor. Fiz. **20** (12): 1064-1082 (In Russian)

105. Ginzburg, V. L., L. D. Landau, M. Leontovich, V. Fock. 1946. About the inconsistency of A. A. Vlasov works on the generalized plasma theory and solid state theory. Zh. Eksp. Teor. Fiz. **16** (3): 246-252 (In Russian)

106. Ginzburg, V. L. and A. A. Rukhadze. 1975. Waves in magnetoactive plasma. Second revised edition. Nauka, Moscow (In Russian)

107. Girifalco, L. A. 2000. Statistical Mechanics of Solids. Oxford University Press, Oxford

108. Glansdorff, P. and I. Prigogine. 1971. Thermodynamic Theory of Structure, Stability and Fluctuations. Wiley-Interscience, London

109. Golovin, G. 1945. Alexander Stepanovich Popov. Molodaya Gvardiya, Moscow (In Russian)

110. Goncharov, G. A. 1996a. American and Soviet H-bomb development programmes: historical background. Physics-Uspekhi **39** (10): 1033-1044

111. Goncharov, G. A. 1996b. Thermonuclear milestones. Phys. Today **49** (11): 44

112. Gorbunov, D. S. and V. A. Rubakov. 2011a. Introduction to the Theory of the Early Universe. Hot Big Bang Theory. World Scientific, Singapore

113. Gorbunov, D. S. and V. A. Rubakov. 2011b. Introduction to the Theory of the Early Universe. Cosmological Perturbations and Inflationary Theory. World Scientific, Singapore

114. Gordon, A. 2019. Interview, https://sem40.co.il/315810-intervju-s-aleksandrom-gordonom-avtorom-trilogii-trilogii-bezrodnye-patrioty-korennye-chuzhaki-urozhdennye-inozemcy.html (In Russian)

115. Gorobets, B. S. 2008. Landau and Lifshitz Circle. URSS, Moscow (In Russian)

116. Gorter, C. J. 1955. The two fluid model for superconductors and helium II. Prog. Low Temp. Phys. **1**, p. 1-16.

117. Grad, H. 1949. On the kinetic theory of rarefied gases. Comm. Pure Appl. Math. **2** (4): 331-407

118. Gurevich, L. E. and A. D. Chernin. 1978. Introduction to Cosmogony. Origin of the Large-Scale Structure of the Universe. Nauka, Moscow (In Russian)

119. Gurevich, Yu. Ya. 1986. Solid Electrolytes. Nauka, Moscow (In Russian)

120. Gurov, K. P. 1966. Foundations of the Kinetic Theory. N. N. Bogolyubov's method. Nauka, Moscow (In Russian)

121. Harned, H. S., B. B. Owen. 1939. The Physical Chemistry of Electrolytic Solutions. Reinhold Publishing Corporation, New York

122. Harrison, W. A. 1966. Pseudopotentials in the Theory of Metals. W. A. Benjamin, New York

123. Harrison, W. A. 1980. Electronic Structure and the Properties of Solids. The Physics of the Chemical Bond. W. H. Freeman, San Francisco

124. Haugen, K. L. 2011. Richard Bentley. Poetry and Enlightenment. Harvard University Press, Cambridge, MA

125. Hazeltine, R. D. and F. Waelbroeck. 2018. The Framework of Plasma Physics. CRC Press, Boca Raton

126. Heisenberg, W. 1932. Über den Bau den Atomkerne. Zs. Phys. **77** (1): 1-11 (In German)

127. Hénon, M. 1982. Vlasov equation? Astron. Astrophys. 114 (1): 211-212

128. Hernández-Gómez, J. J. and R. W. Gómez-González. 2021. An historical account of the two-fluid theory for superfluidity. Eur. J. Phys. **42** (4): 043001

129. Hill, H. M. 2022. Physics Nobel honors foundational quantum entanglement experiments. Phys. Today **75** (12): 14-17

130. Hodge, P. W. 1986. Galaxies. Harvard University Press, Cambridge, MA

131. Inaba, H. 2015. Reading Elementary Principles: Gibbs and the origin of statistical mechanics. Ann. Phys. (Berlin) **527** (11-12): A102-A104

132. Infeld, L. 1947. Portrait: Einstein. Amer. Scholar **16** (3): 337-341

133. Inglesfield, J. E. 1982. Surface electronic structure. Rep. Prog. Phys. **45** (3): 223-284

134. Ivanchenko, Yu. M. and A. A. Lisyansky. 1995. Physics of Critical Fluctuations. Springer, New York

135. Iveronova, V. I., G. V. Kurdyumov and Ya. S. Umanskii. 1970. Sergei Tikhonovich Konobeevskiy (on his Eightieth Birthday). Sov. Physics-Uspekhi **13** (3): 424-426

136. Iwanenko, D. 1932. The neutron hypothesis. Nature **129** (3265): 798

137. Jackson, J. D. 1998. Classical Electrodynamics. John Wiley, Hoboken, NJ

138. Jackson, J. D. 2008. Examples of the zeroth theorem of the history of science. Amer. J. Phys. **76** (8): 704-719

139. Jeans, J. H. 1902. The stability of a spherical nebula. Phil. Trans. R. Soc. Lond. **199** (312-320) 1-53

140. Jeans, J. H. 1915. On the theory of star-streaming and the structure of the Universe. Monthly Notices Roy. Astron. Soc. **76** (2): 70-84

141. Jeans, J. H. 1919. Problems of Cosmology and Stellar Dynamics. Cambridge University Press, Cambridge

142. Kadomtsev, B. B. 1968. Landau damping and echo in a plasma. Sov. Physics-Uspekhi **11** (3): 328-337

143. Kadomtsev, B. B. 1976. Collective Phenomena in Plasma. Nauka, Moscow (In Russian)

144. Kadomtsev, B. B., L. V. Keldysh, I. Yu. Kobzarev, and R. Z. Sagdeev. 1972. Apropos A. A. Tyapkin's paper: "Expression of the general properties of physical processes in the space-time metric of the special theory of relativity." Sov. Physics-Uspekhi **15** (2): 230-231

145. Kanevskiy, B. A. and V. A. Senderov. 1980. Intellectual Genocide. Exams for Jews: Moscow State University, Moscow Institute of Physics and Technology, Moscow Engineering and Physical Institute. Moscow, https://www.mccme.ru/shen/senderov/ig-text.pdf (In Russian)

146. Khlopov, M. Yu. and S. G. Rubin. 2004. Cosmological Pattern of Microphysics in the Inflationary Universe. Springer, Dordrecht

147. Kienle, H. Ed. 1924. Probleme der Astronomie. Festschrift für Hugo v. Seeliger dem Forscher und Lehrer zum Fünfundsiebzigsten Geburtstage. Springer, Berlin (In German)

148. Kiessling, M. K.-H. 2003. The "Jeans swindle". A true story—mathematically speaking. Adv. Appl. Math. **31** (1): 132-149

149. Kittel, C. 1963. Quantum Theory of Solids. John Wiley, New York

150. Klimontovich, Yu. L. 1982a. Kinetic Theory of Nonideal Gases and Nonideal Plasmas. Pergamon Press, Oxford

151. Klimontovich, Yu. L. 1982b. Statistical physics. Nauka, Moscow (In Russian)

152. Klimontovich, Yu. L. 1997. Physics of Collisionless Plasma. Physics-Uspekhi **40** (1): 25-51

153. Kojevnikov, A. 2002. David Bohm and collective movement. Hist. Stud. Phys. Biol. Sci. **33** (1): 161-192.

154. Komnik, Yu. F. 1979. Physics of metallic films. Dimensional and structural effects. Atomizdat, Moscow (In Russian)

155. Kontorovich, V. M. 1984. Dynamic equations of the theory of elasticity of metals. Sov. Physics-Uspekhi **27** (2): 134-158

156. Kostyrchenko, G. V. 2003. Stalin's Secret Policy. Power and Anti-Semitism. Mezhdunarodnye Otnosheniya, Moscow (In Russian)

157. Kostyrchenko, G. V. Ed. 2012. State Anti-Semitism in the USSR. From Start to Climax. 1938–1953. MFD: Materik, Moscow (In Russian)

158. Kragh, H. 1996. Cosmology and Controversy. The Historical Development of Two Theories of the Universe. Princeton University Press, Princeton

159. Kragh, H. 2003. Who discovered the expanding universe? Hist. Sci. **41** (2): 141-162

160. Kragh, H. 2015. Masters of the Universe. Conversations with Cosmologists of the Past. Oxford University Press, Oxford

161. Kragh, H. 2017. Eddington's dream: A failed theory of everything, In: Ed. I. T. Durham, and D. Rickles. Information

and Interaction. Eddington, Wheeler, and the Limits of Knowledge. Springer, Cham, P. 45–58.

162. Kragh, H. S. and D. Lambert. 2007. The Context of Discovery: Lemaître and the Origin of the Primeval-Atom Universe. Ann. Sci. **64** (4): 445-470

163. Krall, N. A. and A. W. Trivelpiece. 1973. Principles of Plasma Physics. McGraw-Hill, New York

164. Kuznetsov, V. 2021. Modified structure–nominative reconstruction of practical physical theories as a frame for the philosophy of physics. Epistemological Studies in Philosophy, Social and Political Sciences. **4** (1): 20–28, https://doi.org/https://doi.org/10.15421/342103

165. Lagendijk, A., B. van Tiggelen and D. S. Wiersma. 2009. Fifty years of Anderson localization. Phys. Today **62** (8) 24-29.

166. Landau, L. 1937. The kinetic equation in the case of Coulomb interaction. Zh. Eksp. Teor. Fiz. **7** (2): 203-209 (In Russian)

167. Landau, L. 1946. On electron plasma oscillations. Zh. Eksp. Teor. Fiz. **16** (7): 574-586 (In Russian)

168. Landau L. D. and E. M. Lifshitz. 1969. Statistical physics. L. D. Landau and E. M. Lifshitz Course of Theoretical Physics. Volume 5, Part 1. Third Edition, Revised and Enlarged. Pergamon, Oxford

169. Landau L. D. and E. M. Lifshitz. 1980. The classical theory of fields. L. D. Landau and E. M. Lifshitz Course of Theoretical Physics. Volume 2. Fourth Revised English Edition. Butterworth-Heinemann, Amsterdam

170. Landau L. D. and E. M. Lifshitz. 1987. Fluid Mechanics. L. D. Landau and E. M. Lifshitz Course of Theoretical Physics. Volume 6. Second Edition. Pergamon, Oxford

171. Lang, N. D. 1973. The density-functional formalism and the electronic structure of metal surfaces. In: Ed. H. Ehrenreich, F. Seitz and D. Turnbull. Solid State Physics Advances in Research and Applications. Volume 28. Academic Press, New York, P. 225–300

172. Langmuir, I. 1928. Oscillations in ionized gases. Proc. Nation. Acad. Sci. (USA) **14** (8) 627-637

173. Larkin, A. and A. Varlamov 2005. Theory of Fluctuations in Superconductors. Oxford University Press, Oxford

174. Lemaitre, G. 1931. The Expanding Universe. Month. Notices Roy. Astron. Soc. **91** (5): 490-501

175. Lenin, V. I. 1968. Party and party literature. In: V. I. Lenin. Full Collection of Papers. Fifth edition. Volume. 12. Political Literature Publishing House, Moscow (In Russian)

176. Lewis Carrol. 2005. Alice's Adventures in Wonderland. Icon Classics, San Diego

177. Liboff, R. L. 2003. Kinetic Theory. Classical, Quantum, and Relativistic Descriptions. Third Edition. Springer, New York

178. Lieb, E. H. and R. Seiringe. 2009. The Stability of Matter in Quantum Mechanics. Cambridge University Press, Cambridge

179. Lifshitz, E. 1946. On the gravitational stability of the expanding universe. Zh. Eksp. Teor. Fiz. **16** (5): 587-602 (In Russian)

180. Lifshitz, E. 2017. Republication of: On the gravitational stability of the expanding universe. Gen. Relativ. Gravit. **49** (2): 18

181. Lifshitz, E. M. and I. M. Khalatnikov. 1963. Investigations in relativistic cosmology. Adv. Phys. **12** (46): 185-249

182. Lifshitz, E. M. and L. P. Pitaevskii. 1981. Physical Kinetics. L. D. Landau and E. M. Lifshitz Course of Theoretical Physics. Volume 10. Pergamon, Oxford

183. Lindhard, J. 1954. On the properties of a gas of charged particles. Kgl. Danske Videnskab. Selskab. Mat.-Fys. Medd. **28** (8): 1-57

184. Logunov, A. A. and M. A. Mestvirishvili. 1989. The relativistic theory of gravitation. Mir, Moscow

185. Lord Kelvin. 1902. On the clustering of gravitational matter in any part of the universe. Phil. Mag. **3** (13): 1-9

186. Lord Kelvin. 1904. Baltimore Lectures on Molecular Dynamics and the Wave Theory of Light. Clay and Sons, London

187. Lord Rayleigh, O. M. 1906. VII. On electrical vibrations and the constitution of the atom. Phil. Mag. **11** (61): 117-123

188. Lynden-Bell, D. 1962. The stability and vibrations of a gas of stars. Month. Notices Roy. Astron. Soc. **124** (4): 279-296

189. Lyon, M. and S. L. Rolston. 2017. Ultracold neutral plasmas. Rep. Prog. Phys. **80** (1) 017001

190. Maksimov, A. A., I. V. Kuznetsov, Ya. P. Terletskiy and N. F. Ovchinnikov Ed. 1952. Philosophical Issues of Modern Physics. AN SSSR, Moscow (In Russian)

191. Malik, K. A. and D. R. Matravers. 2019. How Cosmologists Explain the Universe to Friends and Family. Springer, Cham

192. Malmberg, J. H. and C. B. Wharton. 1964. Collisionless damping of electrostatic plasma waves. Phys. Rev. Lett. **13** (6): 184-186

193. March, N. and M. Parrinello. 1982. Collective Effects in Solids and Liquids. Adam Hilger, Bristol

194. Massa, C. 1985. Strong interaction and nucleon mass. Amer. J. Phys **53** (9): 908-909

195. Maudlin, T. 2011. Quantum Non-Locality and Relativity. Metaphysical Intimations of Modern Physics. Third Edition. Blackwell Publishers, Oxford

196. Mayer, J. E. and M. Goeppert Mayer. 1977. Statistical Mechanics. Second Edition. Wiley-Interscience, New York

197. Mazo, R. M. 2002. Brownian Motion. Fluctuations, Dynamics and Applications. Clarendon Press, Oxford

198. McCrea, W. H. and E. A. Milne. 1934. Newtonian Universes and the curvature of space. Quart J. Math. **5** (1): 73-80

199. Mensky, M. B. 2010. Consciousness and Quantum Mechanics. Life in Parallel Worlds. Miracles of Consciousness from Quantum Reality. World Scientific Publishing Company, Singapore

200. Milonni, P. W. 2019. An Introduction to Quantum Optics and Quantum Fluctuations. Oxford University Press, Oxford

201. Misner, C. W., K. S. Thorne, and J. A. Wheeler. 1973. Gravitation. W. H. Freeman, San Francisco

202. Mitrokhin, N. 2003. Russian Party. The Movement of Russian Nationalists in the USSR. 1953-1985. Novoe Literaturnoe Obozrenie, Moscow (In Russian)

203. Møller, C. 1955. Theory of Relativity. Oxford University Press, Oxford

204. Mouhot, C. and C. Villani. 2011. On Landau damping. Acta Math. **207** (1): 29-201

205. Mukhin, K. N., A. F. Sustavov and V. N. Tikhonov. 2006. Russian Physics of the Nobel Level. Fizmatlit, Moscow (In Russian)

206. Nadzhafov, D. G. Ed. 2005. Stalin and Cosmopolitanism. Documents of Agitprop of the Central Committee of the CPSU. 1945-1953. MFD: Materik, Moscow (In Russian)

207. Naimark, N. M. 2011. Stalin Genocides. Publishing house: “Kyiv-Mohyla Academy”, Kyiv (in Ukrainian)

208. Naselsky, P. D., D. I. Novikov and I. D. Novikov. 2006. The Physics of the Cosmic Microwave Background. Cambridge University Press, Cambridge

209. Nekrich, A. M. 1978. The Punished Peoples. The Deportation and Tragic Fate of Soviet Minorities at the End of the Second World War. WW Norton & Co, New York

210. Newton, I. 2004. Letter 1 to Richard Bentley. In Ed. A. Janiak. I. Newton, Philosophical Writings. Cambridge University Press, Cambridge, P. 94-95

211. Nicolis, G. and I. Prigogine. 1977. Self-Organization in Non-Equilibrium Systems. John Wiley & Sons, New York

212. Norton, J. D. 1999. The cosmological woes of Newtonian gravitation theory. In: H. Goenner, J. Renn, J. Ritter and T. Sauer. Ed. The Expanding Worlds of General Relativity: Einstein Studies, Volume 7. Birkhäuser, Boston, 1999, P. 271-323

213. Novikov, I. D. 1990. Evolution of the Universe. Nauka, Moscow, P. 127-132 (In Russian)

214. O’Raifeartaigh, C., M. O’Keeffe, W. Nahm and S. Mitton. 2017. Einstein’s 1917 static model of the universe: a centennial review. Eur. Phys. J. H **42** (3): 431-474

215. O’Raifeartaigh, C., M. O’Keeffe, W. Nahm and S. Mitton. 2018. One hundred years of the cosmological constant: from “superfluous stunt” to dark energy. Eur. Phys. J. H **43** (1) 73-117

216. Orlov, A. 1953. The Secret History of Stalin's Crimes. Random House, New York

217. Pais, A. 1982. Subtle is the Lord. The Science and the Life of Albert Einstein. Oxford University Press, Oxford

218. Peebles, P. J. E. 2020. Cosmology’s Century. Princeton University Press, Princeton

219. Perlov, D. and A. Vilenkin. 2017. Cosmology for the Curious. Springer, Cham

220. Pesceli, H. L. 2000. Fluctuations in Physical Systems. Cambridge University Press, Cambridge

221. Pines, D. and Ph. Nozières. 2018. Theory of Quantum Liquids. Volume I. Normal Fermi Liquids. CRC, Boca Raton

222. Popov, V. Yu. and V. P. Silin. 2014. Vlasov modes in the theory of ion-acoustic turbulence. Plasma Phys. Rep. **40** (4): 298-305

223. Rabinowitch, A. 2009. The Bolsheviks Come to Power. The Revolution of 1917 in Petrograd. W. W. Norton & Co, New York

224. Rapoport, Ya. L. 1988. At the Turn of Two Epochs. The 1953 Doctor Affair. Kniga, Moscow (In Russian)

225. Roberts, J. K. and A. R. Miller. 1960. Heat and thermodynamics. Interscience Publishers, New York

226. Rodríguez-Vellando, P. 2019. ...and so Euler discovered Differential Equations. Found. Sci. **24** (2): 343-374

227. Rukhadze, A. A. 2010. Events and People. Fifth Edition, Revised and Enlarged. Nauchtekhlitizdat, Moscow (In Russian)

228. Rukhadze, A. A. and V. P. Silin. 2019. From Lord Rayleigh to Professor A. A. Vlasov (from 1906 to 1945). Physics-Uspekhi. **62** (7): 691-698

229. Rumer, M. Sh. and Yu. B. Ryvkin. 1980. Thermodynamics, Statistical Physics, and Kinetics. Mir, Moscow

230. Ryden, B. 2017. Introduction to Cosmology. Second Edition. Cambridge University Press, Cambridge

231. Ryutov, D. D. 1999. Landau damping: half a century with the great discovery. Plasma Phys. Control. Fusion **41** (3A): A1-A12

232. Sagan, D. 1994. On the physics of Landau damping. Amer. J. Phys. **62** (5): 450-462

233. Sanders, R. H. 2016. Deconstructing Cosmology. Cambridge University Press, Cambridge

234. Sardanashvili, G. A. 2009. Dmitry Ivanenko – Superstar of Soviet Physics: An Unwritten Memoir. URSS, Moscow (In Russian)

235. Shafranov, V. D. 1967. Electromagnetic waves in a plasma. In: Acad. M. A. Leontovich. Ed. Reviews of Plasma Physics. Volume 3. Consultants Bureau, New York, P. 1-157

236. Shankland, R. S. 1964. Michelson-Morley experiment. Amer. J. Phys. **32** (1): 16-35

237. Shkarofsky, I. P., T. W. Johnston, and M. P. Bachynski. 1966. The Particle Kinetics of Plasma. Addison-Wesley, Reading, MA

238. Shockley, W. and J Bardeen. 1950. Energy bands and mobilities in monatomic semiconductors. Phys. Rev. **77** (3): 407-408

239. Silin, V. P. 1971. Introduction to the Kinetic Theory of Gases. Nauka, Moscow (In Russian)

240. Silin, V. P. 2012. Ion-acoustic turbulence in plasmas. Ukr. J. Phys. **57** (3): 322-329

241. Silin, V. P. 2013. Landau damping of plasma waves. Plasma Phys. Rep. **39** (13): 1055-1059

242. Silin, V. P. 2014. Myth about the error by A. A. Vlasov and about his book of 1945. Bull. Lebedev Phys. Inst. **41** (4): 103-109

243. Silin, V. P. and A. A. Rukhadze. 1961. Electromagnetic Properties of Plasma and Plasma-Like Media. Gosatomizdat, Moscow (In Russian)

244. Sitenko, A. 1967. Electromagnetic Fluctuations in Plasma. Academic Press, New York

245. Smirnov, B. M. 2006. Principles of Statistical Physics. Distributions, Structures, Phenomena, Kinetics of Atomic Systems. Wiley-VCH, Weinheim

246. Smirnov, B. M. 2015. Theory of Gas Discharge Plasma. Springer, Cham, 2015

247. Sonar, T. 2018. The History of the Priority Dispute between Newton and Leibniz. Mathematics in History and Culture. Birkhäuser, Cham

248. Sonin, A. S. 1994. Physical Idealism. The History of One Ideological Campaign. Nauka, Moscow (In Russian)

249. Sonin, A. S. 2011. Fight Against Cosmopolitanism in Soviet Science. Nauka, Moscow (In Russian)

250. Sorokin, Yu. N. 1955. Alexander Fedorovich Mozhaiskiy – Creator of the First Airplane. Collection of Documents. AN SSSR, Moscow (In Russian)

251. Spiegel, E. A. 1999. Gravitational screening. In: Ed. A. Harvey. On Einstein's Path. Essays in Honor of Engelbert Schucking. Springer, New York, P. 465-474

252. Stenographic Report of the VASKhNIL Session July 31 – August 7, 1948: On the Situation in Biological Science. 1948. OGIZ-SEL'KHOZGIZ, Moscow (In Russian)

253. Suvorov, S. G. 1969. On certain epistemological problems in physics. Sov. Physics-Uspekhi **12** (3): 359-377

254. Thiele, R. 1982. Leonhard Euler. Teubner, Wiesbaden (In German)

255. Thomson, J. J. 1904. XXIV. On the structure of the atom: an investigation of the stability and periods of oscillation of a number of corpuscles arranged at equal intervals around the circumference of a circle; with application of the results to the theory of atomic structure. Phil. Mag. **7** (39): 237-265

256. Thorne, K. S. 2019. LIGO and gravitational Waves, III: Nobel lecture, December 8, 2017, Ann. Phys. (Berlin) **531** (1) 1800350

257. Tolman, R. C. 1949. Relativity, Thermodynamics, and Cosmology. Clarendon Press, Oxford

258. Tonks, L. and I. Langmuir. 1929. Oscillations in ionized gases. Phys. Rev. **33** (2): 195-210

259. Tyapkin, A. A. 1972. Expression of the general properties of physical processes in the space-time metric of the special theory of relativity. Sov. Physics-Uspekhi **15** (2): 205-229

260. Van Kampen, N. G. 1955. On the theory of stationary waves in plasmas. Physica **21** (6-10): 949-963

261. Van Kampen, N. G. 1957. Dispersion equation for plasma waves. Physica **23** (7): 641-650

262. Vedenyapin, V. V. 2001. Boltzmann and Vlasov Kinetic Equations. Fizmatlit, Moscow (In Russian)

263. Vizgin, V. P. 2001. On the discovery of the gravitational field equations by Einstein and Hilbert: new materials. Physics-Uspekhi **44** (12): 1283-1298

264. Vladimirov, S.V. and K. Ostrikov. 2004. Dynamic self-organization phenomena in complex ionized gas systems: new paradigms and technological aspects. Phys. Rep. **393** (3-6): 175–380

265. Vlasov, A. A. 1938. On vibrational properties of electron gas. Zh. Eksp. Teor. Fiz. **8** (3): 291-318 (In Russian)

266. Vlasov, A. A. 1950. Many Particle Theory. GITTL, Moscow (In Russian)

267. Vlasov, A. A. 1966. Statistical Distribution Functions. Nauka, Moscow (In Russian)

268. Vlasov, A. A. 1978. Nonlocal Statistical Mechanics. Nauka, Moscow (In Russian)

269. Weinberg, S. 2008. Cosmology. Oxford University Press, Oxford

270. Weiss, R. 2019. LIGO and gravitational Waves, I: Nobel lecture, December 8, 2017, Ann. Phys. (Berlin) **531** (1) 1800349

271. Will, C. M. 2018. Theory and experiment in gravitational physics. Cambridge University Press, Cambridge

272. Will, C. M. and N. Yunes 2020. Is Einstein Still Right? Oxford University Press, Oxford

273. Yakovenko, N. 2007. Introduction to History. Krytyka, Kyiv (In Ukrainian)

274. Yakovlev, A. N. Ed. 2002. Drama of Russian History. Bolsheviks and Revolution. New Chronograph, Moscow (In Russian)

275. Yaroshevskiy, M. G. Ed. 1991. Repressed Science. Issue I. Nauka, Leningrad (In Russian)

276. Yaroshevskiy, M. G. Ed. 1994. Repressed Science. Issue II. Nauka, St. Petersburg (In Russian)

277. Yukawa, H. 1949. Models and methods in the meson theory. Rev. Mod. Phys. **21** (3): 474-479

278. Zangwill, A. 2021. A Mind Over Matter. Philip Anderson and the Physics of the Very Many. Oxford University Press, Oxford

279. Zel'dovich, Ya. B. and I. D. Novikov. 1983. Relativistic Astrophysics. Volume 2. The Structure and Evolution of the Universe. University of Chicago Press, Chicago, P. 237–309.

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