B. I. Shklovskii and A. L. Efros, “Electronic properties of doped semiconductors”, Springer (1984).

40 years after.

B. I. Shklovskii, University of Minnesota.

This Shklovskii-Efros (SE) book was first published in Soviet Union in Russian in 1979. In 1983 we added Chapter 14 and made other smaller updates for English version. The book is still widely used. It is available from Amazon.com and electronically from my website https://www.physics.umn.edu/people/shklovsk.html.
The goal of this Supplement written in 2022 is to add brief comments and references, which reflect new developments of SE book original ideas. Each comment is attached to a chapter of the book.

Chapter 2

Substantial progress with identification of the metal-insulator transition and finding its critical indexes was achieved using analysis of level statistics:

1. B. I. Shklovskii, B. Shapiro, B. R. Sears, P. Lambrianidis, H. B. Shore, Statistics of spectra of disordered systems near the Metal-Insulator transition, Phys. Rev. B 47, 11487 (1993).

2. B. L. Altshuler, I. Zharekeshev, S. A. Kotochigova, B. I. Shklovskii, Repulsion between energy levels and the metal-insulator transition, Zh. Eksp. Teor. Fiz. 94, 343 (1988) - Engl. Transl.: Sov. Phys.-JETP 67, 625 (1988).

3. B.L. Altshuler, B.I. Shklovskii, Repulsion of energy levels and conductivity of small metallic samples, Zh. Eksp. Theor. Fiz. 91, 220 (1986) - Engl. Transl: Sov. Phys.-JETP 64, 127 (1986).

4. Yi Huang, B. I. Shklovskii, "Anderson transition in three-dimensional non-Hermitian disorder" Phys. Rev. B, 101, 014204 (2020).

5. Yi Huang, B. I. Shklovskii "Spectral rigidity of non-Hermitian symmetric random matrices" Phys. Rev. B **102**, 064212 (2020).

Chapter 9

Ideas of tunneling with scattering of Refs. [9.26, 9.27, 9.28] were applied to theories of negative magnetoresistance, Aharonov-Bohm oscillations, and mesoscopic transport for variable range hopping conductivity:

6. B.Z. Spivak, V.A. Kharchenko, B.I. Shklovskii, Scattering effect on VRH conduction, Fiz. Tekh. Poluprov. 19, 493 (1985).

7. V.L. Nguyen, B.Z. Spivak, B.I. Shklovskii, Tunnel hops in disordered systems, Zh. Eksp.Theor. Fiz. 89, 1770 (1985) - Engl. transl.: Sov. Phys.-JETP 62, 1021 (1985).

8. V.L. Nguyen, B.I. Shklovskii, B.Z. Spivak, Aharonov-Bohm oscillations with normal and superconductive flux-quanta in hopping conduction, Pis'ma Zh. Eksp. Teor. Fiz. 41, 35 (1985) - Engl. transl: Sov. Phys. JETP Letters 41, 42 (1985).

9. B.I. Shklovskii and B.Z. Spivak, Interference phenomena in variable range hopping conductivity in "Hopping and related phenomena", edited by H. Fritzsche and M. Pollak, 1990, World Scientific Publishing Company.

10. B.I. Shklovskii, B.Z. Spivak, Scattering and interference phenomena in variable range hopping conduction, in: "Hopping conduction in semiconductors," ed. by M. Pollak and B.I. Shklovskii, North-Holland, Amsterdam (1990).

In SE book we dealt only with the ohmic hopping conductivity (linear response to a small applied electric field). Theory of nonohmic hopping transport in strong electric fields leading to nonlinear current-voltage characteristics was developed in Refs. [9.54, 9.55] and in following works:

11. B.I. Shklovskii, Hopping conduction in semiconductors in a strong electric field, Fiz. Tekh. Poluprov. 6, 2335 (1973) - Engl. transl.: Sov. Phys.-Semicond. 6, 1964 (1973).

12. E.I. Levin, Nguyen Van Lien, B.I. Shklovskii, Hopping electrical conduction in strong electric fields: A numerical computer experiment, Fiz. Tekh. Poluprov. 16, 815 (1982) -Engl. transl.: Sov. Phys. Semicond. 16, 523 (1982).

13. E.I. Levin, B.I. Shklovskii, Low-temperature hopping conduction in strong electric field. Computer experiment, Fiz. Tekh. Poluprov 18, 856 (1984) - Engl. transl: Sov. Phys.-Semicond., 11, 534 (1984).

14. S.Marianer, B.I Shkiovskii, Effective temperature of hopping electrons in a strong electric field, Phys. Rev. B 46, 13100 (1992).

15. Nguyen Van Lien, B.I. Shklovskii, Hopping conduction in strong electric fields and directed percolation, Solid State Commun. 38, 99 (1981).

16. D.I. Aladashvili, Z. Adamia, K. Lavdovskii, E.I. Levin, B.I. Shklovskii, Negative differential resistance in hopping region in silicon, Pis'ma v Zh. Eksp. Teor. Fiz. 47. 390 (1988) - Engl. Transl.: Sov. Phys.-JETP Lett. 47. 466 (1988).

17. E.I. Levin, B.I. Shklovskii, Negative differential conductivity of low density electron gas in random potential, Solid State Comm. 67. 233 (1988).

18. E.I. Levin, I.M. Ruzin, B.I. Shklovskii, Transverse hopping conductivity of amorphous films in strong electric fields. Fiz. Tekh. Polup. 22, 624 (1988) - Engl. Transl.: Sov. Phys.-Semicond. 22, 401 (1988).

19. E.I. Levin, I.M. Ruzin, B.I. Shklovskii, Transverse hopping conductivity of amorphous films in strong electric fields. Fiz. Tekh. Polup. 22, 624 (1988) - Engl. Transl.: Sov. Phys.-Semicond. 22, 401 (1988).

20. D.I. Aladashvili, Z. Adamia, K. Lavdovskii, E.I. Levin, B.I. Shklovskii, Frenkel-Pool effect in hopping conduction of weakly compensated semiconductors, Fiz. Tekh. Poluprov 23, 213 (1989) - Engl. Transl: Sov. Phys. Semicond. 21, 132 (1989).

21. D.I. Aladashvili, Z. Adamia, K. Lavdovskii, E.I. Levin and B.I. Shklovskii, Non-Ohmic hopping conductivity of weakly compensated semiconductors, Fiz. Tekhn. Poluprov. 24; (1990) - Engl. Transl: Sov. Phys.-Semicond. 24 (1990).

Chapter 10

Multiple numerical studies of the Coulomb gap density of states confirmed power laws for three and two-dimensional case predicted in Ref. [10.5] and did not find exponential depletion of one-electron density of states at smallest energies due to the polaron effects predicted for three-dimensional case in Ref. [10.11]. This puzzle was resolved in the following paper (see also references therein to best numerical studies of the density of states):

22. A. L. Efros, Brian Skinner, B. I Shklovskii, "Coulomb gap in the one-particle density of states in three-dimensional systems with localized electrons." Phys. Rev. B 84, 064204 (2011).

Direct Monte-Carlo studies of variable range hopping also confirmed ES law:

23. E.I. Levin, B.I. Shklovskii, Low-temperature hopping conduction in strong electric field. Computer experiment, Fiz. Tekh. Poluprov 18, 856 (1984) - Engl. transl: Sov. Phys.-Semicond., 11, 534 (1984).

24. D. N. Tsygankov, A. L. Efros, Variable Range Hopping in Two-Dimensional Systems of Interacting Electrons Phys. Rev. Letters 88, 176602 (2002).

It is shown Chapter 14 that many-particle polaron effects only weakly modifies coefficient in exponent of Efros-Shklovskii VRH law Eq. (10.1.18).

In the last 35 years ES law was observed in hundreds of papers. Here I mention only a few:

25. Screening of the Coulomb interaction in two-dimensional variable-range hopping, F. W. Van Keuls, X. L. Hu, H. W. Jiang, and A. J. Dahm, Phys. Rev. B 56, 1161 (1997).

26. Magneto-transport of magnetite nanoparticle arrays, Hao Zheng, C. T. Black, R. L. Sandstrom, P. M. Rice, C. B. Murray, Shouheng Sun, Phys. Rev. B **73**, 020402(R) (2006).

Particularly important was experimental confirmation that ES law describes the low temperature diagonal conductivity of localized states in QHE minima:

27. G. Ebert, K. von Klitzing, C. Probst, E. Schuberth, K. Ploog, G. Weinmann, Solid State Commun. 45, 625 (1983). Two-dimensional magneto-quantum transport on GaAs-$Al_xGa_{1-x}As$ heterostructures under non-ohmic conditions.

28. A. Briggs, Y. Gulder, J. P. Vieren, M. Voos, J. R. Hirtz, J. P. Razeghi, Low-temperature investigations of the quantum Hall effect in InxGa1−xAs−InP heterojunctions, Phys. Rev. B 27, 6549.

29. M. Furlan, Electronic transport and the localization length in the quantum Hall effect, Phys. Rev. B 57, 14818 (1998).

30. K. Bennaceur, P. Jacques, F. Portier, P. Roche, and D. C. Glattli, "**Unveiling quantum Hall transport by Efros-Shklovskii to Mott variable-range hopping transition in graphene"** Phys. Rev. B **86**, 085433 (2012).

31. F. Hohls, U. Zeitler, and R. J. Haug, Hopping Conductivity in the Quantum Hall Effect: Revival of Universal Scaling, Phys. Rev. Lett. 88, 036802 (2002).

These works allowed to make connection between ES law and the width of diagonal conductivity peak as a function of temperature, current and frequency:

32. D. G. Polyakov, B.I. Shklovskii, Conductivity peak broadening in the quantum Hall regime, Phys. Rev. B48, 11167 (1993).

Predictions of this paper were confirmed in [28, 29, 30] and in

33. H. P. Wei, L. W. Engel, D. C. Tsui "Current scaling in the integer quantum Hall effect" Phys. Rev. B 50 (1994).

Evolution of the Coulomb gap shape in a doped semiconductor near metal-insulator transition was addressed in following two papers:

34. W. L. McMillan, Scaling theory of the metal-insulator transition in amorphous materials, Phys. Rev. B 24, 2739 (1981).

35. Mark Lee, J. G. Massey, V. L. Nguyen, B. I. Shklovskii "Coulomb Gap in a Doped Semiconductor near the Metal-Insulator Transition: Tunneling Experiment and ScalingAnsatz", Phys. Rev. B 60, 1582 (1999).

The above McMillan-Shklovskii scaling ansatz is based on the absence of the local screening of the Coulomb gap confirmed by following numerical experiment

36. S.D. Baranovskii, B.I. Shklovskii, A.L. Efros, Screening in localized electron system, Zh. Eksp. Teor. Fiz. 1793 (1984) - Engl. transl: Sov. Phys. JETP 60 1031 (1984).

McMillan-Shklovskii scaling ansatz was supported by two recent theoretical papers:

37. M. Amini, V. E. Kravtsov, M. Mueller, Multifractality and quantum to classical crossover in the Coulomb anomaly at the Mott-Anderson metal-insulator transition New J. of Physics, 16, 015022 (2014).

38. I.S. Burmistrov, I.V. Gornyi, and A.D. Mirlin, Tunneling into the localized phase near Anderson transitions with Coulomb interaction, Phys. Rev. B 89, 035430 (2014).

Hopping conductivity in an array of metal granules, semiconductor quantum dots or nanocrystals attracts large attention. Below, I list theoretical works on this subject (they all lead to ES law at low temperatures):

39. B.I. Shklovskii, New problem of percolation theory and conduction of granular metals, Fiz.-Tv. Tela 26 585 (1984).

40. J. Zhang, B. I. Shklovskii “Density of States and Conductivity of Granular Metal or Array of Quantum Dots” Phys. Rev. B, 70, 115317 (2004).

41. Tao Hu, B. I. Shklovskii, “Hopping conductivity of a suspension of nanowires in an insulator”, Phys. Rev. B 74, 054205 (2006).

42. Brian Skinner, Tianran Chen, B. I. Shklovskii, Theory of hopping conduction in arrays of doped semiconductor nanocrystals, Phys. Rev. B 85, 205316 (2012).

43. Tianran Chen, Brian Skinner, B. I. Shklovskii, Coulomb gap triptych in a periodic array of metal nanocrystals, Phys. Rev. Lett. 109, 126805 (2012).

44. Tianran Chen, Brian Skinner, B. I. Shklovskii, Coulomb gap triptychs, \sqrt{2} effective charge, and hopping transport in periodic arrays of superconductor grains, Phys. Rev. B 86, 045135 (2012).

45. Han Fu, K. V. Reich, B. I. Shklovskii, Hopping conductivity and insulator-metal transition in films of touching semiconductor nanocrystals, Phys. Rev. B 93, 125430 (2016).

46. K. V. Reich, B. I. Shklovskii, “Dielectric Constant and Charging Energy in Array of Touching Nanocrystals”, Appl. Phys. Lett. 108, 113104 (2016).

47. Ting Chen, K. V. Reich, N. J. Kramer, Han Fu, U. R. Kortshagen, B. I. Shklovskii, “Metal-Insulator transition in doped semiconductor nanocrystal films”, Nature Materials, 15, 299 (2016).

48. B. Greenberg, Z. Robinson, K. V. Reich, C. Gorynski, B. Voigt, L. Francis, B. I. Shklovskii, E. Aydil, U. Kortshagen. "ZnO Nanocrystal Networks Near the Insulator-Metal Transition: Tuning Contact Radius and Electron Density with Intense Pulsed Light" Nano Lett., 17, 4634 (2018).

Variable range hopping between insulated long metallic needles dispersed in an insulator was studied in

49. Tao Hu, B. I. Shklovskii, “Hopping conductivity of a suspension of nanowires in an insulator”, Phys. Rev. B 74, 054205 (2006).

Correlated arrangement of electrons leading to the Coulomb gap can be considered as a superposition several scales the Wigner crystals. The theory of Wigner crystal, therefore, is my constant subject of interest:

50. L. I. Glazman, I. M. Ruzin, B.I. Shklovskii, Quantum transport and pinning of one-dimensional Wigner crystal, Phys. Rev. 45, 8454 (1992).

51. I.M.Ruzin, S.Marianer, B.I.Shklovskii, Pinning of two dimensional Wigner crystal by charged impurities, Phys. Rev. B46, 3999 (1992)

52. A. A. Koulakov, B. I. Shklovskii "Charging Spectrum and Configurations of a Wigner Crystal Island" Phys. Rev. B 57, 2352 (1998).

53. B. I. Shklovskii, "Coulomb gap and variable range hopping in a pinned Wigner crystal" Phys. Stat. Sol. (c) 1, 46 (2004).

While thinking whether electrons of a spin split high Landau Level of 2DEG can form Wigner crystal we predicted that instead their repulsion leads to stripe and bubble phases:

54. A. A. Koulakov, M. M. Fogler, and B. I. Shklovskii, "Charge density wave in two-dimensional electron liquid in a weak magnetic field," PRL 76, 499 (1996)

55. A. A. Koulakov, M. M. Fogler, and B. I. Shklovskii, "The Ground State of a Two-Dimensional Electron Liquid in a Weak Magnetic Field," Phys. Rev. B54, 1853 (1996).

These phases were discovered experimentally. This is a review of the first 6 years of stripes and bubbles:

56. M. M. Fogler, Stripe and bubble phases in Quantum Hall systems, High Magnetic Fields: Applications in Condensed Matter Physics and spectroscopy (Springer-Verlag, Berlin, 2002). ArXiv: cond-mat/0111001.

Following the paper

57. A. H. MacDonald and M. P. A. Fisher, Phys. Rev. B 61, 5724 (2000)

we calculated anisotropy of the resistivity in the stripe phase which is in agreement with experimental data for GaAs samples:

58. M. Sammon, X. Fu, Yi Huang, M. A. Zudov, B. I. Shklovskii, G. C. Gardner, J. D. Watson, M. J. Manfra, K. W. Baldwin, L. N. Pfeiffer, and K. W. West "Resistivity anisotropy of quantum Hall stripe phases" Phys. Rev. B 100, 241303(R) (2019).

59. Yi Huang, M. Sammon, M. A. Zudov, B. I. Shklovskii, “Isotropically conducting (hidden) quantum Hall stripe phases in a two-dimensional electron gas” Phys. Rev. B, 101, 161302 (2020).

60. X. Fu, Yi Huang, M. A. Zudov, B. I. Shklovskii, G. C. Gardner, M. J. Manfra, Hidden quantum Hall stripes in $Al_xGa_{1-x}As/Al_{0.24}Ga_{0.76}As$ quantum wells, Phys. Rev. B **102**, (2020).

On other hand, we used the concept of Wigner crystal beyond solid state physics, namely in Chemistry and Biology of multivalent ions in water solutions. This direction of my work is reviewed in:

61. T. T. Nguyen, A. Yu. Grosberg, B. I. Shklovskii, Colloquium: “Physics of charge inversion in chemical and biological systems”, Rev. Mod. Phys. 74, 329 (2002).

Later biological applications of Wigner like charge correlations in water solutions are listed below:

62. A. Kamenev, J. Zhang, B. I. Shklovskii, A. I. Larkin, “Transport in one dimensional Coulomb gas: From ion channels to nanopores” Physica A, 359, 129 (2005).

63. A. Kamenev, J. Zhang, B. I. Shklovskii, Conductance of ion channels and nanopores with charged walls: a toy model” Phys. Rev. Lett. 95, 148101 (2005).

64. A. Kamenev, J. Zhang, B. I. Shklovskii “Ion exchange phase transitions in "doped" water--filled channels” Phys. Rev. E **73**, 051205 (2006).

65. T. T. Nguyen, B. I. Shklovskii, “Inversion of DNA charge by a positive polymer via fractionalization of the polymer charge”, Physica A 310, 197 (2002).

66. Tao Hu, B. I. Shklovskii, “Kinetics of viral self-assembly: a role of ss RNA antenna”, Phys. Rev. E 75, 051901 (2007).

67. R. Zhang, B. I. Shklovskii, “Phase diagram of solution of oppositely charged polyelectrolytes” Physica A, 352, 216 (2005).

My other important biological papers are:

68. B. I. Shklovskii, “A simple derivation of the Gompertz law for human mortality” Theory in Biosciences, 123, 431 (2005).

69. Tao Hu, A. Yu. Grosberg, B. I. Shklovskii “How do proteins search for their specific sites on coiled or globular DNA” Biophys. J. 90, 2731 (2006).

Chapter 13

Theory of nonlinear screening of long-range potential developed in Chapters 3 and 13 was applied to nonlinear screening of random potential of remote impurities by two-dimensional electron gas in QHE devices:

70. B.I. Shklovskii, A.L. Efros, Density of state oscillations of 2d electron gas in magnetic field, Pis'ma Zh. Eksp. Theor. Fiz. 44, 95 (1986) - Engl. Transl: Sov. Phys.-JETP Letters 44, 669 (1986).

71. A.L. Efros, Solid State Commun. 67, 1019 (1988); A.L. Efros, Solid State Commun. 65, 1281 (1988); A.L. Efros, Phys. Rev. B 45, 11354 (1992).

72. D. B. Chklovskii, B. I. Shklovskii and L. I. Glazman, Electrostatics of edge states Phys. Rev. B 46, 4026 (1992).

73. D. B. Chklovskii, K. A. Matveev, B. I. Shklovskii, Ballistic conductance of interacting electrons, Phys. Rev. B47, 12605 (1993).

74. M. M. Fogler, B. I. Shklovskii, Resistance of a long wire in the quantum Hall regime, Phys. Rev. B50 1656 (1994).

75. D. G. Polyakov, B. I. Shklovskii, Universal prefactor of activated conductivity in the Quantum Hall Effect, Phys. Rev. Lett. 74, 150 (1995).

76. M. M. Fogler, B. I. Shklovskii, Thermally activated deviations from Quantum Hall Plateaus, Solid State Commun. 94, 503 (1995).

77. M. M. Fogler, B. I. Shklovskii, Collapse of spin-splitting in the quantum Hall effect, Phys. Rev. B, 52, 17366 (1995).

The concept of completely compensated semiconductor found an application to topological insulators and superconductor-insulator transition:

78. Brian Skinner, Tianran Chen, B. I. Shklovskii, “Why is the bulk resistivity of topological insulators so small?” Phys. Rev. Lett. 109, 176801 (2012).

79. Brian Skinner, B. I. Shklovskii, “Theory of the random potential and conductivity at the surface of a topological insulator” Phys. Rev. B 87, 0755454 (2013).

80. Yi Huang, B. I. Shklovskii “Disorder effects in topological insulator thin films” Phys. Rev. B **103**, 165409 (2021).

81. Yi Huang, B. I. Shklovskii “Disorder effects in topological insulator nanowires” Phys. Rev. B 104, 054205 (2021).

82. Yi Huang, Yanjun He, Brian Skinner, B. I. Shklovskii “Conductivity of two-dimensional narrow gap semiconductors subjected to strong Coulomb disorder” Phys. Rev. B **105**, 054206 (2022).

83. Yi Huang, Brian Skinner, B. I. Shklovskii “Conductivity of two-dimensional small gap semiconductors and topological insulators in strong Coulomb disorder” arXiv:2201.11652.

84. M. Mueller, B. I. Shklovskii, “Compensation driven superconductor-insulator transition” Phys. Rev. B 79, 134504 (2009).

Several recent papers are devoted to nonlinear screening in by electron gas in SrTiO3 (STO):

85. K. V. Reich, M. Schecter, B. I. Shklovskii, Accumulation, inversion, and depletion layers in SrTiO_3. Phys. Rev. B 91, 115303 (2015).

86. Han Fu, K. V. Reich, B. I. Shklovskii, Collapse of electrons to a donor cluster in SrTiO_3. Phys. Rev. B 92, 035204 (2015).

87. Han Fu, K. V. Reich, B. I. Shklovskii, Anomalous conductivity, Hall factor, magnetoresistance, and thermopower of accumulation layer in SrTiO_3 Phys. Rev. B 94, 045310 (2016).

88. M. Sammon, Han Fu, B. I. Shklovskii, “Electron accumulation layer in ultra-strong magnetic fields”, Low Temperature Physics, 43, 232 (2017) [Fizika Nizkih Temperatur, 43, 283 (2017).]

89. Yi Huang, Y. Ayino, B. I. Shklovskii, "Metal-insulator transition in *n*-type bulk crystals and films of strongly compensated **$SrTiO_3$**" Phys. Rev. Materials, 5, 044606 (2021).

Chapter 14

Our 1985 paper [14.31] is the review of results for the high frequency and microwave hopping conductivity. Our main prediction that that microwave conductivity is proportional to the first power of frequency in contrary to famous Mott's second power [14.27] was confirmed in several papers:

90. F. Hohls, U. Zeitler, R. J. Haug, "High frequency conductivity in the Quantum Hall regime" Phys. Rev. Lett. 86, 5124 (2001).

91. R. M. Lewis, J. P. Carini, "Frequency scaling of microwave conductivity in the Integer Quantum Hall Effect Minima" Phys. Rev. B 64, 073310 (2000).

92. M. Hering, M. Scheffler, M. Dressel and H. v. Löhneysen, Phys. Rev. B 75, 205203 (2007).

High frequency works were complemented by several works on low frequency 1/f noise of hopping conductivity:

93. B.I. Shklovskii, Theory of 1/f noise for hopping conduction, Solid State Commun. 33, 273 (1980).

94. S. M. Kogan, B. I. Shklovskii, Excessive low frequency noise in hopping conduction, Fiz. Tech. Poluprov 15, 1049 (1981).

95. B. I. Shklovskii, "1/f noise in variable range hopping conduction" Phys. Rev. B 67, 045201 (2003).

96. A. L. Burin, Yu. M. Galperin, V. Kozub, V. Vinokur, B. I. Shklovskii, "Many-electron theory of 1/f-noise in hopping conductivity" Phys. Rev. B 74, 075205 (2006).

Hopping energy and spin relaxation, hopping photoconductivity, hopping recombination of electrons and holes were studied in following papers:

97. B.I. Shklovskii, Model of surface recombination in amorphous semiconductors, Pis'ma Zh. Eksp. Theor. Fiz. 44, 95 (1986), - Engl. Transl: Sov. Phys.-JETP letters 14, 123 (1986).

98. S.D. Baranovskii, E.I. Ivchenko, B.I. Shklovskii, New regime of recombination of photoinduced carriers in amorphous semiconductors, Zh. Eksp. Theor. Fiz. 22, 2234 (1987) - Engl. Transl.: Sov. Phys.-JETP 65, 1260 (1987).

99. S.D. Baranovskii, V.G. Karpov, B.I. Shklovskii, Theory of non-radiative recombination in amorphous semiconductors, J. Non-Cryst. Solids 97-98, 487 (1987).

100. S.D. Baranovski, B.I. Shklovskii, V.G. Karpov, Theory of non-radiative recombination in amorphous semiconductors, Zh. Eksp. Teor. Fiz. 94, 278 (1988) - Eng. Transl.: Sov. Phys.-JETP 67, 588 (1988).

101. B.I. Shklovskii, H. Fritzsche and S.D. Baranovskii, Electronic Transport and Recombination in Amorphous semiconductors at Low Temperatures, Phys. Rev. Lett. 62, 2989 (1989).

102. S. D. Baranovskii, H. Fritzsche, E. I. Levin, I. M. Ruzin, B. I. Shklovskii, Low temperature electronic transport and recombination in amorphous semiconductors, Zh. Eksp. Teor. Fiz. 96, 1362 (1989) - Engl. Transl.: Sov. Phys. JETP 70, (1989).

103. I.M. Ruzin, B.I. Shklovskii, Theory of hopping photoconductivity at low-frequency excitation, Fiz. Tekhn. Poluprov. 23. 1881 (1989) - Engl. Transl. Sov. Phys.-Semicond. 23, (1989).

104. B. I. Shklovskii "Dyakonov-Perel spin relaxation near metal-insulator transition and in hopping transport" Phys. Rev. B 73, 193201 (2006).

Continuation of the study of negative compressibility of low-density two-dimensional electron gas which was started in Ref. [14.32] can be found in following works:

105. B. Skinner, B. I. Shklovskii, "Anomalously large capacitance of a plane capacitor with a two-dimensional electron gas", Phys. Rev. B 82, 155111 (2010).

106. Brian Skinner, B. I. Shklovskii, "Giant capacitance of a plane capacitor with a two-dimensional electron gas in a magnetic field" Phys. Rev. B 87, 035409 (2013).

107. Brian Skinner, G. L. Yu, A. V. Kretinin, A. K. Geim, K. S . Novoselov, B. I. Shklovskii, "The effect of electron dielectric response on the quantum capacitance of graphene in a strong magnetic field." Phys. Rev. B 88, 155417 (2013).

108. M. Sammon, B. I. Shklovskii "Attraction of indirect excitons in van der Waals hetero-structures with three semiconductor layers" Phys. Rev. B 99, 165403 (2019).

109. Brian Skinner, Tianran Chen, B. I. Shklovskii, Cooperative Charging in a Nanocrystal Assembly Gated By Ionic Liquid, Phys. Rev. B 84, 245304 (2011).