

CURRICULUM VITAE

Yakov L. Alpert

- Born:** March 1, 1911, at Ivnitsy, near Zhitomir, Ukraine.
- Degrees:**
- 1939** Moscow State University, Department of Physics, AB-AM.
 - 1941** "Candidate of Physical Sciences" (Ph.D.), Lebedev Physical Institute, Academy of Sciences of the USSR.
 - 1948** "Doctor of Physical and Mathematical Sciences", Lebedev Physical Institute, Full Professor, Ministry of Education, USSR.

Areas of Research:

1. Theoretical and experimental study of radio wave propagation along the surface of the Earth, in the Earth-ionosphere waveguide, and in the ionosphere. Velocities of (extra low - high) frequency electromagnetic waves.
2. Propagation of atmospheric and of man-made electromagnetic signals in the Earth-ionosphere waveguide; spectral characteristics at different distances from the source.
3. Physical structure of the ionosphere and magnetosphere.
4. Theoretical study of interaction of moving bodies with a magnetoplasma.
5. Theoretical and experimental study of wave processes in near-Earth plasma and in space.

Research Posts and Activities

- 1931-35 Radio-technician, Experimental Radio Institute, USSR Ministry of Communications.
- 1935-52 Laboratory assistant, Scientific collaborator, Senior Scientist, Head of group, Lebedev Physical Institute, USSR Academy of Sciences (PhIAN).
- 1952-75 Chief of Laboratory, Scientific Deputy Director, Head of the Department of Space Physics of Near-Earth Plasma, Institute of Terrestrial Magnetism, Ionosphere and Propagation of Radio Waves (IZMIRAN), USSR Academy of Sciences.
- 1975-87 Senior Scientist, Professor Advisor (part time), IZMIRAN.
- 1988 - 2001 Senior Staff Scientist, Harvard Smithsonian Center for Astrophysics, Cambridge, MA. In this capacity, Prof. Alpert had NASA Contracts as Principal Investigator.
- 1990 - 1996 Research Consultant, AT&T Bell Laboratories.
- 1946-51 Scientific Secretary, USSR Committee for the Union Radio Scientifique Internationale (URSI).
- 1952-75 Member of different scientific committees and councils of the Academy of Sciences of the USSR.
- 1958 Member, Technical Working Group, United Nations Conference on Experts on Detecting Nuclear Explosions at High Altitudes
- 1975 Member of the European and American Physical Societies, etc.
- 1982 Docteur Honoris Causa of the University of Orleans, France.
- 1983 Honorary Life Member of the New York Academy of Sciences, USA.
- 1990 First Gimprich Family Foundation Fellowship, New York Academy of Sciences.

- 1946-1975 Various prizes from the Academy of Sciences and State medals and awards.
- 1953-1988 Many invitations to give lectures and seminars, for visiting professorships and overseas scholarships, etc. from England, USA, Sweden, France, India, and other countries. But he was never permitted to accept these invitations until 1988.
- 1988 Overseas Scholarship in St. John's College and Cavendish Laboratory, Cambridge, England.
- 1989 Regent Lecturer, Visiting Professor, University of California, Los Angeles, USA.
- 1989 Regent Lecturer, Visiting Professor, University of California, San Diego, USA.
- 1990 Visiting Scientist, L'Ecole Polytechnique, Paris, France.
- 1990-1998 Presented 8 invited talks at the conferences in Honolulu (Hawaii), Brussels (Belgium), Sendai, Kyoto, Tokyo (Japan), San Diego, Queen Mary (California), Atlanta (Georgia), Washington (DC).

Selected Publications

BOOKS

- 1947** *Propagation of Radio Waves in the Ionosphere*, Gostechizdat, Moscow, 276 pages, in Russian.
- 1953** *Propagation of Radio Waves, a bibliographical reference book*, USSR Academy of Sciences Press, Moscow, 194 pages, in Russian.
- (with V.L. Ginzburg and E.L. Feinberg) *Propagation of Radio Waves*, Gostechizdat, Moscow, 883 pages, in Russian.
- 1954** *Low Frequency Electromagnetic Waves Propagation over the Surface of the Earth*, USSR Academy of Sciences Press, Moscow, 111 pages, in Russian. Translated into English and published by Morris D. Friedman, Inc., Foreign Technical Translations, **1957**.
- 1960** *Radio Wave Propagation and the Ionosphere* (A new monograph different from the book of 1947) USSR Academy of Sciences Press, 480 pages, in Russian. Translated into English and published by Consultants Bureau, New York, **1963**, 394 pages. 2nd edition **1973**, Vol. 1, 430 pp., Vol. 2, 268 pp.
- 1964** (with A.V. Gurevich and L.P. Pitajevskij) *Artificial Satellites in a Rarefied Plasma*, Press Nauka (Science), Moscow, 382 pages, in Russian. Translated into English under title *Space Physics of Artificial Satellites*, Consultants Bureau, New York, 240 pages.
- 1967** (with E.G. Guseva and D.S. Fligel) *Propagation of Low Frequency EM Waves in the Earth-Ionosphere Waveguide*, Press Nauka (Science), Moscow, 122 pages, in Russian. Translated into English and published by Boulder Laboratories, National Bureau of Standards, **1967**.
- 1970** (with D.S. Fligel) *Propagation of ELF and VLF Waves Near the Earth*, Revised and enlarged version of the book of 1967, Consultants Bureau, New York - London, 171 pages, in English.
- 1972** *Propagation of EM waves and the Ionosphere*, Second Edition of the book of 1960, revised and enlarged, Press Nauka, Moscow, 563 pages, in Russian.

- 1973** *Radio Wave Propagation and the Ionosphere: Volume I - The Ionosphere*, 439 pages; Volume II, *Propagation of Electromagnetic Waves Near the Earth*, 268 pages. Enlarged version of the book of 1972, Consultants Bureau, New York - London, in English.
- 1974** *Waves and Satellites in the Near-Earth Plasma*, Press Nauka, 214 pages, in Russian. Translated into English and published by Consultants Bureau, New York - London, 196 pages.
- 1983** *The Near-Earth and Interplanetary Plasma*, Volume I – *General Properties and Fundamental Theory*, 299 pages. Volume II - *Plasma Flow, Plasma Waves and Oscillations*, 259 pages, Cambridge University Press, London - New York, in English.
- 1990** *Space Plasma: Volume I - Theory and Main Properties*, 307 pages; Volume II - *Flow, Waves and oscillations*, 286 pages. (Paperback re-issue of the book of 1983, with a new Appendix), Cambridge Atmospheric and Space Science Series, Cambridge University Press.
- 2000** *Making Waves, Stories From My Life*, 256 pages, Yale University Press, New Haven & London.

EARLY PAPERS

- 1936** (with V. Migulin) *On a nonlinear autoparametric resonance effect in a vacuum-tube generator* (in Russian), *Journal of Technical Physics*, (J. Tech. Phys.) 6, pp. 812-818.
- 1939** *Investigation of the electromagnetic field in the near zone of an antenna* (in Russian), *J. Tech. Phys.*, 9, pp. 824-830.
- 1940** *Propagation of electromagnetic waves in waveguides* (in Russian), *J. Tech. Phys.*, 10, pp. 1358-1364.
- 1941** (with V. Migulin and P. Ryasin) *Investigation of the phase structure and the velocity of radio waves above the surface of the Earth*: in Russian, *Proc. Acad. Sci. USSR*, 4, pp. 458-467; in English, *J. Phys.* 4, pp. 13-38.
- 1944** (with S. Rytov) *On compensation of radio-noise* (in Russian), *J. Tech. Phys.*, 14, pp. 730-748.
- (with V. Ginzburg) *Absorption of radio-waves in the ionosphere*, (in Russian), *Proc. Acad. Sci. USSR (Izvestiya Acad. Sci.)* 8, pp. 42-67.
- 1945** (with B. Gorozhankin) *On coastal refraction*, (in English), *J. Phys.*, 9, pp. 115-122; (in Russian), *J. Tech. Phys.*, 1941, 11, p. 1238.
- (with B. Gorozhankin) *Radio observations during the solar eclipse of July 9, 1945 (corpuscular and ultra-violet emission)*, *Comptes Rendus, Acad. Sci. USSR*, 49, no. 4, p. 254.
- 1946** *Investigations of the phase-structure of electromagnetic waves in the near zone of an emitting antenna* (in Russian), *Proceedings of the Lebedev Physical Institute*, 3, no. 2, pp. 5-43.
- On the anisotropy effect of the ionosphere*, (in English), *Comptes Rendus, Acad. Sci. USSR*, 53, no. 8, p. 699.

- 1947** *On the sporadic F₂ layer of the ionosphere*, (in English), Comptes Rendus (Doklady) Acad. Sci. USSR, 50: no. 1, p. 25; no. 2, p. 107.
- Investigation of F-2 layer of the ionosphere during the solar eclipse of May 20, 1947 in Brazil*, (in English), Comptes Rendus, Acad. Sci. USSR, 58, no. 9, p. 1919.
- 1948** *Trajectories of radio waves and experimental investigations of the anisotropy effect of the ionosphere*, (in Russian), Proc. Acad. Sci. USSR, 12, no. 3, pp. 241-287.
- The structure of the atmosphere and the processes in the F-2 layer*, (in Russian), J. Exp. Theor. Phys. 18, pp. 994-1011.
- 1951** (with A. Ainberg) *The statistical nature of the ionosphere*, J. Exp. Theor. Phys. 21, pp. 389-400.
- 1954** *Theoretical investigations of propagation of ELF and VLF radio waves and of atmospheric*, (in Russian) 1954, Doklady, v. 97, no. 4, p. 629. Radiotekhnika and Elektronika (Radio El.) 1, no. 3, pp. 281-292, 293-308, 1956.
- 1957** *Electron density fluctuations and scattering of radio waves in the ionosphere* (in Russian), J. Exp. Theor. Phys. 33, pp. 213-225.
- 1958** (with F. Dobryakova, E. Chudesenko & B. Shapiro) *The electron density of the outer part of the Ionosphere estimated by investigation of the radio signals of Sputnik 1*, (in Russian), Uspekhi Phys.Nauk, 65, pp. 161-174; Doklady (in English), 120, p. 743.
- 1959** (with S. Borodina) *The velocity of LF electromagnetic waves* (in Russian), Radio. El., 4, pp. 195-201.
- (with D. Fligel) *Synthesis of the atmospheric and the effective parameters of the lower part of the ionosphere*, Radio El., 4, pp. 202-211.
- 1960** *Investigation of the ionosphere and Interplanetary space by satellites and rockets* (in Russian), Uspekhi, 71, pp. 369-409.
- 1961** (with L. Pitaevsky) *Scattering of electromagnetic waves on plasma disturbances produced by fast moving bodies* (in Russian), Geomagn. Aeronom. 1, pp. 709-724.
- 1963** (with V. Belyansky and N.M. Mityakov) *Investigations of the structure of the ionosphere by coherent radio waves emitted by the Kosmos satellites* (in Russian), Geomag. Aeron. 3, pp. 11-24.
- (with V. Belyansky and A. Kuttyakov) *The radio set used for registration of the Doppler shift of coherent radio waves emitted by satellites*, (in Russian), Geomag. Aeron. 3, pp. 157-170.
- Refraction and the frequency Doppler shift of radio waves in a three dimensional inhomogeneous ionosphere* (in Russian), Geomag. Aeron. 3, pp. 626-634.
- 1964** *Results of investigation of the ionosphere by coherent radio waves emitted by satellites* (in Russian), Geomag. Aeron. 4, pp. 479-502.

PAPERS IN ENGLISH

- 1963** (with A.V. Gurevich and L.P. Pitaevsky) *Effects due to an artificial satellite in rapid motion through the ionosphere or the interplanetary medium*, Space Sci. Rev. 2, p. 680.
- 1965** *Electromagnetic effects in the neighborhood of a satellite or a vehicle moving in the ionosphere or in interplanetary space*, Space Sci. Rev. 4, p. 373.
- Some results of ionospheric investigations by means of coherent radio waves emitted by satellites*, Space Sci. Rev., 4, p. 5.
- 1967** *The outer ionosphere and its transition into interplanetary space*, Space Sci. Rev., 6, p. 419.
- VLf and ELf waves in the near-Earth plasma*, Space Sci. Rev. 6, p. 781.
- (with D.S. Fligel and G.A. Michailova) *The propagation of atmospheric waves in the Earth-ionosphere waveguide*, J. Atmos. Terr. Phys. 29, pp. 29-42.
- 1969** (with V.M. Sinelnikov) *On the local and integral electron density of the ionosphere measured by means of coherent radio waves emitted from artificial earth satellites – I*, J. Atmos. Terr. Phys. 31, pp. 641-661.
- 1971** (with V.M. Sinelnikov, L.N. Vitshas, V.I. Krajushkina) *On investigations of the inhomogeneous structure of the outer ionosphere by means of coherent radiowaves emitted from artificial earth satellites—II*, J. Atmos. Terr. Phys. 33, pp. 1779-1787.
- 1972** (with D.S. Fligel, O.V. Kapustina, and I.N. Zabavina) *On the amplitude and phase velocity of VLF and LF e.m. waves in the spherical earth-ionosphere waveguide*, J. Atmos. Terr. Phys. 34, pp. 877-892.
- 1973** (with R.N. Kaufman) *The upward propagation of LF waves (electron whistlers) into the ionosphere and the turning of the Poynting vector towards the Earth's magnetic field*, J. Atmos. Terr. Phys. 35, pp. 1843-1851.
- 1974** (with R.N. Kaufman) *The region in which the Poynting vector of ion ELF waves incident on the ionosphere rotates towards the Earth's magnetic field* J. Atmos. Terr. Phys. 36, pp. 1093-1098.
- 1975** *On the outer ionospheric hydrostatic model*, J. Atmos. Terr. Phys. 37, pp. 1375-1378.
- 1976** *On ionospheric investigations by coherent radio waves emitted from artificial earth satellites*, Space Sci. Rev. 18, pp. 551-602.
- 1977** (with D.S. Fligel) *The locating of hydromagnetic whistler sources and determination of their generating proton spectra*, Planet. Space Sci. 25, pp. 487-497.
- Wave-like phenomena in the near-Earth plasma and interactions with man-made bodies*, Springer-Verlag, Encyclopedia of Physics, Berlin, Heidelberg, New York, Vol. 49/5, pp. 217-349.

- 1980** *Structure of the electromagnetic field in a magnetoactive plasma*, Annals of the New York Academy of Sciences, 337, pp. 185-197.
- 40 years of whistlers*, J. Atmos. Terr. Phys. 42, pp. 1-20.
- The direction of the group velocity of electromagnetic waves in a multicomponent magneto-active plasma in the frequency range $0 < \omega \rightarrow \infty$* , J. Atmos. Terr. Phys. 42, pp. 205-216.
- On elements of the dielectric tensor, the refractive indices n_{12} and attenuation factors κ_{12} of a magnetically active collisional plasma*, J. Atmos. Terr. Phys. 42, pp. 217-226.
- (with B.S. Moiseev) *On the distribution of the field of electromagnetic waves emitted by a dipole in a homogeneous magnetoactive plasma*, J. Atmos. Terr. Phys. 42, pp. 521-528.
- 1981** *On some important features of extra low frequency and low frequency electromagnetic waves $0 \leq \Omega \leq \Omega_L$ in a magnetoplasma connected with the influence of ions*, Annals of the N.Y. Acad. Sci., 373, pp. 138-149.
- 1983** *On the field of the electric Hertzian dipole in a cold magnetoplasma*, Annals of the N.Y. Acad. Sci., 401, pp. 1-22.
- (with K.G. Budden, B.S. Moiseev, and C.F. Stott) *Electromagnetic radiation from a dipole source in a homogeneous magnetoplasma*, Phil. Trans. Roy. Soc. London, A. 309, pp. 503-557.
- 1985** (with D.S. Fligel) *On fourier-analysis of geomagnetic pulsations pc-1, "two-fold" and "three-fold" pulsations pc-1 and fundamental frequencies of the magnetospheric cavity – I*, Planet. Space Sci., 33, pp. 993-1012.
- On the absorption of extra low frequency electromagnetic waves in the magnetoplasma, taking into account collisions between electrons and ions of the same kind*, Annals of the N.Y. Acad. Sci., vol. 452, pp. 31-43.
- On generation of geomagnetic pulsations PC-1 in the magnetospheric cavity*, Annals of the N.Y. Acad. Sci., 491, pp. 30-31.
- 1986** *On an oscillating model of PC-1 geomagnetic pulsations and on some properties of this process*, Planet. Space Sci. 34, pp. 537-541.
- 1987** *On simulating the process of the generation of geomagnetic Pc1 pulsations in the magnetosphere*, Planet. Space Sci. 35, pp. 71-78.
- (with D.S. Fligel) *On fundamental frequencies of the cavity of the magnetosphere, two-fold and three-fold Pc1 pulsations*, Planet. Space Sci. 35, pp. 879-885.
- On spectra and some properties of Pc1 geomagnetic pulsations of a complex shape*, Planet. Space Sci. 35, pp. 1381-1388.
- 1989** (with D.S. Fligel and A.A. Yaroslavtsev) *Spectra of geomagnetic pulsations Pc1 of complex shape and simulation of their generation process*, Planet. Space Sci. 37, pp. 391-405.

- 1990** *Radiation of ELF and VLF electromagnetic waves in a magnetoplasma (in the ionosphere)*, Invited paper, Proceedings of the fourteenth Annual Meeting of the International OMEGA Association, October 2-6, 1989, Long Beach, California, pp. A-1, 9-1 to 9-6 9-I.
- 1991** *On some electromagnetic phenomena in the Tether Magnetoplasma Cloud*, Nouvo Cimento, Italia, 14 C (No. 5), pp. 501-522.
- 1992** *Nonlinear heating of a magnetoplasma: temperature of the ionosphere*, Invited paper, AIAA Journal, 30, (No. 10), pp. 2440-2446.
- On some nonlinear phenomena which could be produced around the Tether Satellite System*, Proceedings of the International School of Plasma Physics, Piero Caldirola, Societa Italiana de Fisico, pp. 165-188.
- Theory and simulation of discrete packets of waves of Pc1 micropulsations generated in the magnetosphere*, Proceedings of the Topical Conference on "Research Trends on Nonlinear and Relativistic Effects in Plasmas", American Institute of Physics, N. Y., pp. 485-525.
- 1993** (with L.J. Lanzerotti, D.J. Thomson, C.G. MacLennan and A. Wolfe) *Hydromagnetic background of the magnetosphere and gyroresonance swinging of a "giant" Pc 2 wave event*, J. Geophys. Res., 98, (A5), pp. 7571-7584.
- 1994** (with J.L. Green) *Cone structure and focusing of VLF and LF electromagnetic waves at high altitudes in the ionosphere*, (Invited paper), AGARD Conference Proceedings 529, ELF/VLF/LF Radio Propagation and System aspects, Symposium at Brussels, Belgium, 28 September - 2 October, 1992, North Atlantic Treaty Organization, pp. 3-1 to 3-11; J. Geophys. Res., 99, (A1), pp. 389-399.
- 1995** *Longitudinal ELF to LF electromagnetic oscillations and waves generated in the ionosphere under the influence of strong high-frequency electric field*, J. Geophys. Res., 100 (A1), 289-304.
- 1997** (with L.J. Lanzerotti) *Oscillatory nature of the magnetosphere, II. The EM-background, strong packets of waves, resonances*, J. Geomag. Geoelect., 49 (Supplement), pp. S85-S119.
- (with L.J. Lanzerotti, and S.T. Rybachek), *Oscillatory nature of the magnetosphere, III. Resonance oscillations. Some simulation*, J. Geomag. Geoelect., 49 (Supplement), pp. S121-S130.
- 2001** *Resonance nature of the magnetosphere*, Physics Reports, North-Holland, Elsevier, 339, (No. 5-6), pp. 323-444.
- 1936-2001** About 200 scientific papers in Russian or in English, and a dozen popular scientific papers in Russian.