PUBLICATIONS by D. SADOVSKIÍ

Theses

[HDR] D. A. Sadovskií, *Dynamical study of quantum systems*, thesis “habilitation à diriger des recherches”, Université du Littoral, Dunkerque, June 19, 1998, English version, 70 p.

[PhD] D. A. Sadovskií, *Rovibrational spectra and structure of quasidegenerate vibrational states of spherical top molecules*, Ph.D. thesis in physics, specialization “Optics”, USSR Academy of Sciences, Moscow, 1989 [in Russian].

[MSc] D. A. Sadovskií, *Analysis of model effective Hamiltonians of tetrahedral molecules*, M.Sc. thesis in chemistry, Moscow State University, 1984 [in Russian].

Manuscripts

[i] S. Yu. Volkov, D. N. Kozlov, V. V. Smirnov, D. A. Sadovskií and B. I. Ẑhilinskií, *Rotational structure of the resonant vibrational states ν_1,ν_3 of $^{28}SiH_4$ and $^{74}GeH_4$* (Institute of General Physics, Moscow, 1988), 67 p. in Russian, see [1].

[ii] D. A. Sadovskií, B. I. Ẑhilinskií and L. Michel, Collapse of the Zeeman structure of the hydrogen atom in the external electric field, preprint P/95/86 (IHES, Bures-sur-Yvette, 1995), see [25].

Scientific papers in refereed journals (total 45, printed 40)

[1] B. I. Ẑhilinskií and D. A. Sadovskií, *Comparative study of spectroscopic constants of tetrahedral molecules: ν_1,ν_3 bands of silane and germane*, Opt. Spectrosc. (USSR) **58**, 565–70 (1985), [p. 490–2 of English transl.], see [i].

[2] D. A. Sadovskií and B. I. Ẑhilinskií, *Theoretical analysis of spectroscopic constants for spherical tops: ν_2,ν_4 bands of AB_4 molecules*, J. Molec. Spectrosc. **115**, 235–57 (1986).

[3] B. I. Ẑhilinskií and D. A. Sadovskií, *Invariant combinations of spectroscopic parameters of tetrahedral molecules*, Vestnik MGU, **27**, 145–48 (1986) [in Russian].

[4] B. I. Ẑhilinskií and D. A. Sadovskií, *Qualitative changes in the rotational structure of vibrational states with increasing angular momentum*, Opt. Spectrosc. (USSR) **61**, 481–6 (1986) [p. 301–4 of English transl.].

[5] D. A. Sadovskií and B. I. Ẑhilinskií, *Qualitative analysis of vibration-rotation hamiltonians for spherical top molecules*, Molec. Phys. **65**, 109–28 (1988).

[6] V. E. Pavlov-Verevkin, D. A. Sadovskií and B. I. Ẑhilinskií, *On the dynamical meaning of the diabolic points*, Europhys. Lett. **6**, 573–78 (1988).

[7] G. Pierre, D. A. Sadovskií and B. I. Ẑhilinskií, *Organization of quantum bifurcations: crossover of rovibrational bands in spherical top molecules*, Europhys. Lett. **10**, 409–14 (1989).

[8] D. A. Sadovskií and B. I. Ẑhilinskií, *Contact transformations in tensor formalism. Effective Hamiltonian and dipole moment for the ν_2, ν_4 dyad of tetrahedral molecules*, J. Qualitat. Spectrosc. Radiat. Transf. **42**, 575–84 (1989).

[9] B. I. Ẑhilinskií et D. A. Sadovskií, *Analysis of qualitative changes in rovibrational structure. The ν_2, ν_4 diad of spherical top molecules*, Izvest. Akad Nauk SSSR, Ser. Fiz. **53**, 1736–40 (1989) [p. 80–3 of English transl.].

[10] D. A. Sadovskií, B. I. Ẑhilinskií, J.-P. Champion and G. Pierre, *Manifestations of bifurcations and diabolic points in molecular energy spectra*, J. Chem. Phys. **92**, 1523–37 (1990).

[11] V. M. Krivtŝun, D. A. Sadovskiı́, E. P. Snegirev, A. P. Shotov and I. I. Zasavitŝkiı́, *Diode laser study of the ν_1 and ν_3 bands of the ${}^{120}SnH_4$ molecule*, J. Molec. Spectrosc. **139**, 107–25 (1990). V. M. Krivtŝun, D. A. Sadovskiı́, and E. P. Snegirev, *Rotational structure of the ν_1, ν_3 bands of ${}^{120}SnH_4$ molecule*, Opt. Spectrosc. (USSR) **70**, 1007–10 (1991) [p. 590–1 of English transl.].

[12] V. M. Krivtŝun, D. A. Sadovskiı́ and B. I. Ẑhilinskiı́, *Critical phenomena and diabolic points in rovibrational energy spectra of spherical top molecules*, J. Molec. Spectrosc. **139**, 126–46 (1990).

[13] O. I. Davarashvili, B. I. Ẑhilinskiı́, V. M. Krivtŝun, D. A. Sadovskiı́ and E. P. Snegirev, *Experimental study of the sequence of bifurcations which causes the crossover of rotational multiplet*, Soviet JETP Lett. **51**, 17–9 (1990).

[14] D. A. Sadovskiı́, *Standard decomposition of the products of spherical tensor equivalent operators*, Phys. Lett. A **156**, 377–80 (1991).

[15] I. Dabrowski, G. Herzberg, J. W. C. Johns, D. A. Sadovskiı́, and M. Vervloet, *Spectra of rare gas hydrides. IV. Three new bands of argon deuteride involving a low-lying "p" Rydberg state of ArD*, J. Chem. Phys. **97**, 7093–111 (1992).

[16] D. A. Sadovskiı́ and B. I. Ẑhilinskiı́, *Group theoretical and topological analysis of localized vibration-rotation states*, Phys. Rev. A **47**(4), 2653–71 (1993).

[17] D. A. Sadovskiı́, N. G. Fulton, J. R. Henderson, J. Tennyson, and B. I. Ẑhilinskiı́, *Nonlinear normal modes and local bending vibrations of H_3^+ and D_3^+*, J. Chem. Phys. **99**(2), 906–18 (1993).

[18] D. A. Sadovskiı́ and B. I. Ẑhilinskiı́, *Qualitative study of a model three level Hamiltonian with SU(3) dynamical symmetry*, Phys. Rev. A **48**(2), 1035–44 (1993).

[19] I. Dabrowski and D. A. Sadovskiı́, *Spectra of rare gas hydrides. V: np Rydberg series of KrD*, Molec. Phys. **81**(2), 291–326 (1994).

[20] T. Amano, M.-C. Chan, S. Civiš, A. R. W. McKellar, W. A. Majewski, D. A. Sadovskiı́, and J. K. G. Watson, *The infrared vibration-rotation spectrum of the D_3^+ molecular ion: extension to higher vibrational and rotational quantum numbers*, Can. J. Phys. **72**, 1007–15 (1994).

[21] W. A. Majewski, A. R. W. McKellar, D. A. Sadovskiı́, and J. K. G. Watson, *New observations and analysis of the infrared vibration-rotation spectrum of H_3^+*, Can. J. Phys. **72**, 1016–27 (1994).

[22] D. A. Sadovskiı́ and B. I. Ẑhilinskiı́, *Counting levels within vibrational polyads. Generating function approach*, J. Chem. Phys. **103**(24), 10520–36 (1995).

[23] D. A. Sadovskiı́ and J. B. Delos, *Organization of bifurcation of periodic orbits*, Phys. Rev. Lett. **75**(11), 2120–3 (1995).

[24] D. A. Sadovskiı́ and J. B. Delos, *Bifurcation of periodic orbits of Hamiltonian systems: Analysis using normal form theory*, Phys. Rev. E **54**(2), 2033–70 (1996).

[25] D. A. Sadovskiı́, B. I. Ẑhilinskiı́ and L. Michel, *Collapse of the Zeeman structure of the hydrogen atom in the external electric field*, Phys. Rev. A **53**(6), 4064–7 (1996), see [ii].

[26] I. Dabrowski and D. A. Sadovskiı́, *Spectra of rare gas hydrides. VI. The nf Rydberg complex of KrD*, J. Chem. Phys. **107**(21), 8874–85 (1997).

[27] D. A. Sadovskiı́ and B. I. Ẑhilinskiı́, *Tuning the hydrogen atom in crossed fields between the Zeeman and Stark limits*, Phys. Rev. A **57**(4), 2867–84 (1998).

[28] D. A. Sadovskiı́ and R. H. Cushman, *Monodromy in perturbed Kepler systems: hydrogen atom in crossed fields*, Europhys. Lett. **47**(1), 1–7 (1999).

[29] D. A. Sadovskií and R. H. Cushman, *Monodromy in the hydrogen atom in crossed fields*, Physica D **142**, 166–96 (2000). available online at http://www.elsevier.com/locate/physd.

[30] D. A. Sadovskií and B. I. Ẑhilinskií, *Monodromy, diabolic points, and angular momentum coupling*, Phys. Lett. A **256**(4), 235–44 (1999).

[31] Ch. Van Hecke, D. A. Sadovskií and B. I. Ẑhilinskií, *Qualitative analysis of molecular rotation starting from inter-nuclear potential*, Eur. Phys. J. D **7**, 199–209 (1999).

[32] G. Dhont, D. A. Sadovskií, B. I. Ẑhilinskií, and V. Boudon, *Analysis of the "unusual" vibrational components of triply degenerate vibrational mode ν_6 of $Mo(CO)_6$ based on the classical interpretation of the effective rotation-vibration Hamiltonian*, J. Mol. Spectrosc. **201**, 95–108 (2000) available online at http://www.idealibrary.com.

[33] D. A. Sadovskií, Normal forms, geometry, and dynamics of atomic and molecular systems with symmetry, in *Symmetry and Perturbation Theory (Proceedings of the international conference SPT2001)*, D. Bambusi, M. Cadoni, and G. Gaeta editors, ISBN 981-02-4793-1 (World Scientific, Singapore, 2001), pp. 191–205.

[34] Ch. Van Hecke, D. A. Sadovskií, B. I. Ẑhilinskií, and V. Boudon, *Rotational-vibrational relative equilibria and the structure of quantum energy spectrum of the tetrahedral molecule P_4*, Eur. Phys. J. D **17**, 13–35 (2001).

[35] L. Grondin, D. A. Sadovskií and B. I. Ẑhilinskií, *Monodromy as topological obstruction to global action-angle variables in systems with coupled angular momenta and rearrangement of bands in quantum spectra*, Phys. Rev. A **65**, 012105-1–15 (2001).

[36] N. N. Nekhoroshev, D. A. Sadovskií and B. I. Ẑhilinskií, *Fractional monodromy of resonant classical and quantum oscillators*, Comptes Rendus Acad. Sci. Paris, Ser. I **335**, 985–88 (2002).

[37] K. Efstathiou, D. A. Sadovskií and R. H. Cushman, *Linear Hamiltonian Hopf bifurcation for point group invariant perturbations of the* 1:1:1 *resonance*, Proc. Roy. Soc. (London) Ser. A **459**(2040), 2997–3019 (2003)

[38] K. Efstathiou and D. A. Sadovskií, *Perturbations of the* 1:1:1 *resonance with tetrahedral symmetry: a three degree of freedom analogue of the two degree of freedom Hénon-Heiles Hamiltonian*, Nonlinearity **17**(2), 415–446 (2004).

[39] M. Joyeux, D. A. Sadovskií and J. Tennyson, *Monodromy of the LiNC/NCLi molecule*, Chem. Phys. Lett. **382**(3-4), 439–442 (2003).

[40] K. Efstathiou, M. Joyeux, and D. A. Sadovskií, *Global bending quantum number and the absence of monodromy in the HCN↔CNH molecule*, Phys. Rev. A **69**(3), 032504-1–15 (2004).

Articles in print or submitted ...

[41] K. Efstathiou, D. A. Sadovskií and B. I. Ẑhilinskií, *Analysis of rotation-vibration relative equilibria on the example of a tetrahedral four atom molecule*, SIAM J. Appl. Dyn. Syst. (SIADS) **?**, in press (2003).

[42] K. Efstathiou, R. H. Cushman, and D. A. Sadovskií, *Hamiltonian Hopf bifurcation of the hydrogen atom in crossed fields*, Physica D **??**, 30 pages (2003), accepted.

[43] *No Polar Coordinates. Lectures by Richard Cushman*, prepared by K. Efstathiou, R. Morrison and D. A. Sadovskií, in Peyresq Lectures, MASIE Summer School, September 2000, editor J. Montaldi (London Math. Soc., Cambridge, UK, 2004), still in press.

[44] R. H. Cushman, H. R. Dullin, A. Giacobbe, D. D. Holm, M. Joyeux, P. Lynch, D. A. Sadovskií, and B. I. Ẑhilinskií, *CO_2 molecule as a quantum realization of the 1:1:2 resonant swing-spring with monodromy*, Phys. Rev. Lett. , in press (2004). (ms. LQ9309, submitted 3/15, accepted 5/15)

[45] A. Giacobbe, R. H. Cushman, D. A. Sadovskií, and B. I. Ẑhilinskií, *Monodromy of the quantum* 1:1:2 *resonant swing–spring*, J. Math. Phys. , submitted (2003), 25 pages.

Manuscripts in preparation ...

[46] I. N. Kozin, D. A. Sadovskií and B. I. Ẑhilinskií, *Assigning vibrational polyads using relative equilibria. Application to ozone*, intended for Spectrochim. Acta A , 20 pages (2003), still in preparation.

[47] M. Joyeux, and D. A. Sadovskií, *Monodromy of the CO_2 molecule*, Phys. Rev. A , full paper (2004), in project.

[48] N. N. Nek̂horoshev, D. A. Sadovskií and B. I. Ẑhilinskií, *Fractional Hamiltonian monodromy*, in preparation , 80 pages (2004).

[49] K. Efstathiou, R. H. Cushman, and D. A. Sadovskií, *Fractional monodromy of the* 1:(−2) *resonance*, in preparation , 30 pages (2004).

Manuscripts in project ...

[50] M. Joyeux?, and D. A. Sadovskií, *Symmetric Hamiltonian Hopf bifurcation in three–mode systems with Fermi resonance* 1:1:2, Phys. Rev. A? , full paper (2004).

[51] K. Efstathiou and D. A. Sadovskií, and B. I. Ẑhilinskií, *On the quadratic deformations of the spherical pendulum*, Nonlinearity , full paper (2004), intended.

[52] K. Efstathiou and D. A. Sadovskií, *Hamiltonian Hopf bifurcations in the hydrogen atom in crossed fields*, possibly for Phys. Rev. A , full paper (2004), intended.

Seminars by D. SADOVSKIÍ

2003 *Molecular analogues of quantum swing–spring* (1 h 30 min). Université de Reims, 29 October 2003.

2003 *Monodromy de molécules triatomiques souples* (Monodromy of floppy triatomic molecules)(45 min). ACI Jeunes Chercheurs “Analyse semiclassique avec applications moléculaires”, Institut Fourier (Grenoble I, UMR 5582). 30 September.

2001 *Equilibres relatifs de systèmes moléculaires réels* (45 min). Lab. de Physique, Université de Bourgogne (Dijon); Lab. de Spectrométrie Physique, Université Joseph Fourier (Grenoble I). November 2001.

2000 *Monodromie et structure des niveaux d’énergie moléculaires et atomiques* (45 min). Université Claude Bernard, Lyon I, 17 février.

1997 *Nonlinear normal modes of the perturbed Coulomb problem* (1 h). Mathematics Research Centre, Warwick, UK, 18 November

1995 Université du Littoral: Introduction sur la dynamique nonlinéaire et théorie des orbites périodiques avec applications en physique atomique et moléculaire (1 h).

1992 Quantum Chaology seminar, Harvard University, Cambridge, MA, USA (invited talk)

1991 Spectroscopy Section, Herzberg Institute of Astrophysics, Ottawa, Canada (1 h)

Talks and presentations by D. SADOVSKIÍ

2004 *Manifestation of monodromy in molecular energy level spectra examples of HCN/CNH vs LiNC/NCLi and CO_2*, workshop Journées semi-classiques moléculaires, organized by San Vũ Ngọc, Institut Fourier, Grenoble, 2-4 February, 2004 (45 min talk)

2003 *Monodromy of floppy triatomic molecules: HCN/CNH vs LiNC/NCLi*, MASIE network workshop on *Singularities of Integrable Foliations of Hamiltonian Systems. Applications in Classical and Quantum mechanics.* Department of Physics, University of Athens Athens, Greece, 10–13 November 2003 (45 min talk)

2003 European Colloquium on High Resolution Molecular Spectroscopy, Université de Bourgogne, Dijon, September 2003 (poster)

2001 *Normal forms, geometry, and dynamics of atomic and molecular systems with symmetry*. Symmetry and Perturbation Theory 2001, special session dedicated to the memory of *Louis Michel*, Cala Gonone, Sardinia, May 11, 2001 (30 min talk)

2000 *Quantum and classical monodromy. Geometric analysis of perturbed hydrogen atom and similar systems.* one day workshop on Symmetries in atoms and molecules, University of Nottingham, UK, 24 November 2000 (1 hour talk)

1999 *Reversing symmetry of relative equilibria in rotation-vibration problem example of tetrahedral molecule A_4*. 2nd workshop on Reversal symmetries in dynamical systems, Depatment of Mathematics, Imperial College, London, December 1–3 1999 (45 min talk)

1999 *Quantum and classical monodromy. Geometric analysis of perturbed hydrogen atom and similar systems.* Gordon Conference on Atomic Physics, Plymouth, NH, 4–9 July(poster)

1998 *Monodromy in perturbed Kepler problems. Hydrogen atom in orthogonal electric and magnetic fields.* Workshop on symplectic geometry and its applications, Mathematics Research Centre, University of Warwick, UK, July 16-17, 1998 (30 min talk)

1997 *Derivation of the nonlinear normal modes from the reduced problem.* Workshop on Nonlinear Dynamics and Spectra of Molecules, Mathematics Research Centre, Warwick, 18-21 March (1 hour talk)

1995 Classical and quantum dynamics in atomic physics (Dieter Wintgen memorial symposium), Freiburg, Germany, September 10–13 (30 min talk)

1994 Annual meeting of the American Physical Society and Division of Atomic, Molecular, and Optical Physics, Washington, D.C., USA (poster)

1993 Workshop : Chaos in quantum mechanics—experiment and theory, Cambridge, Massachussets, USA

1992 Workshop : Chaos in Quantum and Classical Mechanics, Fields Institute, University of Waterloo, Ontario, Canada

1992 Workshop: Highly Excited Electronic and Vibrational Molecular States, Telluride, Colorado, USA (1 hour talk)

1991,92 International Symposium on High Resolution Molecular Spectroscopy, Columbus, Ohio, USA (15 min talks)

1990 Annual Conference on Physical Chemistry, University of Waterloo, Ontario, Canada (poster)

1989 European Colloquium on High Resolution Molecular Spectroscopy, Gießen, West Germany (poster)