Xuanhao Chang

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Education

- **Lomonosov Moscow State University** — Moscow, Russia
  Ph.D. in Physical Chemistry; Department of Chemistry — *Sep 2019 - Sep 2023*
  Vibrational-rotational Molecular spectroscopy, Computational spectroscopy.
- **National Research Tomsk Polytechnic University** — Tomsk, Russia
  Master of Physics; Research School of High-Energy Physics — *Sep 2017 - Jul 2019*
  High-resolution vibrational-rotational spectroscopy.
- **National Research Tomsk State University** — Tomsk, Russia
  Academic Mobility; Faculty of Physics — *Sep 2016 - Jul 2018*
  Theoritical Physics.
- **National Research Tomsk Polytechnic University** — Tomsk, Russia
  Bachelor of Physics; Research School of High-Energy Physics — *Aug 2015 - Jul 2017*
- **Jilin University** — Changchun, China
  Bachelor of Physics; College of Physcics — *Aug 2013 - Aug 2015*

Skills Summary

- **Languages**: Chinese(Native), Russian(Advanced), English(Good skills)
- **Programming**: Wolfram Mathematica, Fortran77/95/08 (OpenMP and Coarray), Latex, Python
- **Tools**: Visual Studio Community/Code, Gaussian, Cfour, Origin, Windows/Lunix
- **Knowledge and Interests**: Quantum Chemistry, Molecular ro-vibrational spectroscopy, Perturbation theory, Lie group/algebra, Differential geometry, Irreducible tensorial operator

Awards and Fellowships

- Chinese Scholarship Council Fellowship, 2015-2023

Experience

- **The laboratory of quantum chemistry and molecular modeling** — Moscow, Russia
  Software Developer — *Sep 2019 - July 2023*
  - **ANCO program developing**: Theory and software design, debugging by comparison with Wolfram Mathematica
  - **RSPT, RSPT_L, PADE programs developing**: Development in theory, debugging and analyzing
- **Department of Chemistry, Lomonosov Moscow State University** — Moscow, Russia
  Teaching Assistant - Prof. Uspenskaya I.A. — *Jan 2021 - Dec 2021*
  - **Physcical Chemistry, Part I,II**: Leading weekly seminar and colloquiums
- **Department of Chemistry, Lomonosov Moscow State University** — Moscow, Russia
  Teaching Assistant - Prof. Novakovskaya Yu.V. — *Sep 2020 - Dec 2020*
  - **Quantum Chemistry and Molecular structure**: Leading weekly seminar

Publications

- **(2023) Xuanhao C., Dobrolyubov E. O., Krasnoshchekov S. V.,**: Normal Ordering of the Angular Momentum Cylindrical Ladder Operators and their Products with Wigner $D^1_{0,\varepsilon}$ functions.
  (To be submitted)
- **(2023) Xuanhao C., Krasnoshchekov S. V.,**: Ab initio line lists and Watson A reduction effective Hamiltonians predicted by the Van Vleck canonical operator perturbation theory.
  (Under Review)
- **(2023) Xuanhao C., Dobrolyubov E. O., Krasnoshchekov S. V., Spectrochim. Acta A, 122071**: Vibrational resonance analysis of linear molecules using resummation of divergent rayleigh–schrödinger perturbation theory series.
  DOI: 10.1016/j.saa.2022.122071
- **(2022) Xuanhao C., Dobrolyubov E. O., Krasnoshchekov S. V., Phys. Chem. Chem. Phys., 24(11), p.6655-6675**: Fundamental studies of vibrational resonance phenomena by multivalued resummation of divergent Rayleigh-Schrödinger perturbation theory series: deciphering polyad structures of three $H_2\ ^{16}O$ isotopologues.
  DOI: 10.1039/d1cp04279c

- **(2021) Krasnoshchekov S. V., Egor O. D., Xuanhao C., JQSRT, 268, 107620**: Hypoflorous acid (hof): A molecule with a rare (1,-2,-1) vibrational resonance and (8,3,2) polyad structure revealed by padé-hermite resummation of divergent rayleigh-schrödinger perturbation theory series.
DOI: 10.1016/j.jqsrt.2021.107620
- **(2020) Krasnoshchekov S. V., Egor O. D.,Xuanhao C., Optics and Spectroscopy, 128(12), p.1927-1938**: Fundamental Analysis of Singular and Resonance Phenomena in Vibrational Polyads of the Difluorosilylene Molecule.
DOI: 10.1134/S0030400X20120942
- **(2020) Xuanhao C., Krasnoshchekov S. V., Pupyshev V. I., Millionshchikov D. V., Phys. Lett. A, 384(19), 126493**: Normal ordering of the su(1, 1) ladder operators for the quasi-number states of the Morse oscillator.
DOI: 10.1016/j.physleta.2020.126493
- **(2019) Krasnoshchekov S. V., Xuanhao C., Int. Rev. Phys. Chem., 38(1), p.63-113**: Ladder operators for Morse oscillator and a perturbed vibrational problem.
DOI: 10.1080/0144235X.2019.1593583
- **(2018) S. Chan, O. V. Gromova, E. S. Bekhtereva, C. Leroy, O. N. Ulenikov , Russian Physics Journal, 61, p.516–520**: Determination of Irreducible Rotational operators on the rotation SO(3) group and T_d point symmetry.
DOI: 10.1007/s11182-018-1428-0

Presentations in International Conferences

- **(2023) Xuanhao C., Krasnoshchekov S. V.,**: "Ab Initio Solution of the Vibration-Rotation Problem with Watson Hamiltonian by Van Vleck Operator Perturbation Theory", The 26th International Conference on High Resolution Molecular Spectroscopy (PRAHA2022, Aug 29th - Sep 2nd, 2022), **oral presentation**
- **(2023) Xuanhao C., Dobrolyubov E. O., Krasnoshchekov S. V.,**: "Vibrational resonance analysis of acetylene using the large order perturbation series and Pade-Hermite approximant", The 26th International Conference on High Resolution Molecular Spectroscopy (PRAHA2022, Aug 29th - Sep 2nd, 2022), **Poster**
- **(2023) Dobrolyubov E. O., Xuanhao C., Krasnoshchekov S. V.,**: "Resonance and Polyads of Carbonyl Sulphide (OCS) Isotopologues Studied by Padé-Hermite Resummation of Divergent RSPT Series", The 26th International Conference on High Resolution Molecular Spectroscopy (PRAHA2022, Aug 29th - Sep 2nd, 2022), **Poster**
- **(2019) Chang X., Krasnoshchekov S. V., Bekhtereva E.S.**: "Ladder Operators for the Morse Oscillator and their application for a perturbed vibrational problem", The 26th Colloquium on High Resolution Molecular Spectroscopy (HRMS Dijon 2019, Aug 26-30, 2019), **Poster**