UNIVERSITAS
GADJAH MADA
**Kajian Komputasional Efek Transport Kuantum Anomali 2D Lanthanum Chloride dengan Pendekatan Numerik
Berbasis Density Functional Theory**
Arifia Pratiwi Nugraheni, Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.; Prof. Sholihun, S.Si., M.Sc., Ph.D.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Absor, M. A. U., 2015. *Density-functional theory based calculations of spin-orbit interaction in ZnO,* Kanazawa: Kanazawa University.

Alam, M. S. et al., 2023. Sign change of anomalous Hall effect and anomalous Nernst effect in the Weyl semimetal CeAlSi. *Physical Review B,* 2.107(8).

Araujo, R. E. & Corbett, J. D., 1981. Lanthanum Monochloride and Lanthanum Sesquichloride. *Inorg. Chem,* Volume 20, pp. 3082-3086.

Arfken, G. B., Weber, H. J. & Harris, F. E., 2013. *Mathematical Methods for Physicist.* 7 ed. s.l.:Elsevier.

Arimoto, K., Koretsune, T. & Nomura, K., 2021. Quantum anomalous Hall effect in a three-dimensional topological-insulator–thin-film-ferromagnetic-metal heterostructure. *Physical Review B,* 6.103(23).

Balendhran, S. et al., 2015. Elemental analogues of graphene: Silicene, germanene, stanene, and phosphorene. *Small,* 2, 11(6), pp. 640-652.

Banerjee, A., Adams, N., Simons, J. & Shepard, R., 1985. *Search for Stationary Points on Surfaces,* s.l.: s.n.

Blundell, S., 2001. *Magnetism in Condensed Matter.* New York: Oxford University Press Inc..

Boothroyd, A. T., 2022. Topological electronic bands in crystalline solids. *Contemporary Physics,* 63(4), pp. 305-327.

Chang, C. Z., Liu, C. X. & Macdonald, A. H., 2023. Colloquium: Quantum anomalous Hall effect. *Reviews of Modern Physics,* 1.95(1).

Chang, C. Z. et al., 2013. Experimental observation of the quantum anomalous Hall effect in a magnetic topological Insulator. *Science,* 4, 340(6129), pp. 167-170.

Durstberger, K., 2002. *Geometric Phases in Quantum Theory,* Wien: s.n.

Emerson, M. S. et al., 2024. Heterogeneous Structure, Mechanisms of Counterion Exchange, and the Spacer Salt Effect in Complex Molten Salt Mixtures Including LaCl3. *Journal of Physical Chemistry B,* 4, 128(16), pp. 3972-3980.

Fang, C., Weng, H., Dai, X. & Fang, Z., 2016. Topological nodal line semimetals. *Chinese Physics B,* 11.25(11).

UNIVERSITAS GADJAH MADA
Kajian Komputasional Efek Transport Kuantum Anomali 2D Lanthanum Chloride dengan Pendekatan Numerik Berbasis Density Functional Theory
Arifia Pratiwi Nugraheni, Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.; Prof. Sholihun, S.Si., M.Sc., Ph.D.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Fu, C. et al., 2024. LaCl3-based sodium halide solid electrolytes with high ionic conductivity for all-solid-state batteries. *Nature Communications,* 12.15(1).

Griffiths, D. J., 2005. *Introduction to Quantum Mechanics.* 2 ed. New Jersey: Pearson Prentice Hall.

Haldane, F. D. M., 1988. Model for a Quantum Hall Effect without Landau Levels: Condensed-Matter Realization of the "Parity Anomaly". *Phys. Rev. Lett,* 10, 61(18), pp. 2015-2018.

Hall, E. H., 1879. On a New Action of the Magnet on Electric Currents. *American Journal of Mathematics,* 2(3), pp. 287-292.

Hohenberg, P. & Kohn, W., 1964. Inhomogenous Electron Gas. *Physical Review B,* 11.136(3).

Ibach, H. & Luth, H., 2009. *Solid-State Physics.* 4 ed. Heidelberg: Springer.

Jain, A. et al., 2013. Commentary: The materials project: A materials genome approach to accelerating materials innovation. *APL Materials,* 1(1).

Jiang, Z. et al., 2018. Screening and Design of Novel 2D Ferromagnetic Materials with High Curie Temperature above Room Temperature. *ACS Applied Materials and Interfaces,* 11, 10(45), pp. 39032-39039.

Jin, L. et al., 2020. Ferromagnetic two-dimensional metal-chlorides MCl (M = Sc, Y, and La): Candidates for Weyl nodal line semimetals with small spin-orbit coupling gaps. *Applied Surface Science,* 8.Volume 520.

Katsura, T. & Tange, Y., 2019. A simple derivation of the Birch–Murnaghan equations of state (EOSs) and comparison with EOSs derived from other definitions of finite strain. *Minerals,* 12.9(12).

Kim, M. et al., 2022. Three-dimensional photonic topological insulator without spin–orbit coupling. *Nature Communications,* 12.13(1).

Kittel, C., 2005. *Introduction to Solid State Physics.* 8 ed. s.l.:John Wiley & Sons, Inc..

Klitzing, K. V., Dorda, G. & Pepper, M., 1980. New Method for High-Accuracy Determination of the Fine-Structure Constant Based on Quantized Hall Resistance. *Phys. Rev. Lett.,* 45(494).

Kohn, W. & Sham, L. J., 1965. Self-Consistent Equations Including Exchange and Correlation Effects. *Physical Review A,* 11.140(4).

Koichi, M., 2021. *VESTA: Introduction.* [Online] Available at: http://www.jp-minerals.org/vesta/en

UNIVERSITAS
GADJAH MADA
**Kajian Komputasional Efek Transport Kuantum Anomali 2D Lanthanum Chloride dengan Pendekatan Numerik
Berbasis Density Functional Theory**
Arifia Pratiwi Nugraheni, Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.; Prof. Sholihun, S.Si., M.Sc., Ph.D.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Li, S. Z., Si, J. S., Yang, Z. & Zhang, W. B., 2024. Weyl nodal loop semimetals and tunable quantum anomalous Hall states in two-dimensional ferromagnetic cerium monohalides. *Physical Review B,* 3.109(11).

Liu, C. X., Zhang, S. C. & Qi, X. L., 2016. The Quantum Anomalous Hall Effect: Theory and Experiment. *Annual Review of Condensed Matter Physics,* 3, Volume 7, pp. 301-321.

Liu, S., Chen, M., Fu, C. & Zhu, T., 2023. The Interplay of Magnetism and Thermoelectricity: A Review. *Advanced Physics Research,* 9.2(9).

Liu, X., Hsu, H. C. & Liu, C. X., 2013. In-plane magnetization-induced quantum anomalous hall effect. *Physical Review Letters,* 8.111(8).

Liu, Z. et al., 2018. Intrinsic Quantum Anomalous Hall Effect with In-Plane Magnetization: Searching Rule and Material Prediction. *Physical Review Letters,* 12.121(24).

Lopes, E. V. C. & Schmidt, T. M., 2024. Tuning quantum anomalous Hall effect in ferromagnetic 1T-CrX2 (X = Bi, Sb) monolayers. *Applied Physics Letters,* 12.125(24).

Luan, J. et al., 2023. Controlling the Zero Hall Plateau in a Quantum Anomalous Hall Insulator by In-Plane Magnetic Field. *Physical Review Letters,* 5.130(18).

Lu, J. et al., 2025. Quantum anomalous Hall effect and proximity coupling effect induced valley polarization in Ti3STe4 monolayer. *Physical Review B,* 2.111(7).

Lyalin, A., Solov'yov, A. V. & Greiner, W., 2006. Structure and magnetism of lanthanum clusters. *Physical Review A - Atomic, Molecular, and Optical Physics,* 74(4).

Mahatara, S. & Kiefer, B., 2021. Layer dependent magnetism and topology in monolayer and bilayers ReX 3(X = Br, I). *Journal of Physics Condensed Matter,* 11.33(45).

Marder, M. P., 2010. *Condensed matter physics.* 2 ed. New Jersey: John Wiley & Sons, Inc..

Miyazaki, T. & Jin, H., 2012. *The Physics of Ferromagnetism.* Heidelberg: Springer.

Mizuguchi, M. & Nakatsuji, S., 2019. Energy-harvesting materials based on the anomalous Nernst effect. *Science and Technology of Advanced Materials,* 1, 20(1), pp. 262-275.

UNIVERSITAS
GADJAH MADA
**Kajian Komputasional Efek Transport Kuantum Anomali 2D Lanthanum Chloride dengan Pendekatan Numerik
Berbasis Density Functional Theory**
Arifia Pratiwi Nugraheni, Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.; Prof. Sholihun, S.Si., M.Sc., Ph.D.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Mohebpour, M. A., Mozvashi, S. M., Vishkayi, S. I. & Tagani, M. B., 2020. Prediction of hydrogenated group IV–V hexagonal binary monolayers. *Scientific Reports,* 12.10(1).

Mounet, N. et al., 2018. Two-dimensional materials from high-throughput computational exfoliation of experimentally known compounds. *Nature Nanotechnology,* 3, 13(3), pp. 246-252.

Nadeem, M. & Wang, X., 2023. Topological Dirac Spin-Gapless Materials - a New Horizon for Topological Spintronics Without Spin-Orbit Interaction. *Advanced Physics Research,* 7.

Nagaosa, N. et al., 2010. Anomalous Hall effect. *Reviews of Modern Physics,* 5, 82(2), pp. 1539-1592.

Nie, S., Weng, H. & Prinz, F. B., 2019. Topological nodal-line semimetals in ferromagnetic rare-earth-metal monohalides. *Physical Review B,* 1.99(3).

Onoda, M. & Nagaosa, N., 2003. Quantized Anomalous Hall Effect in Two-Dimensional Ferromagnets: Quantum Hall Effect in Metals. *Physical Review Letters,* 90(20), p. 4.

Ou, Y. et al., 2018. Enhancing the Quantum Anomalous Hall Effect by Magnetic Codoping in a Topological Insulator. *Advanced Materials,* 1.30(1).

Ozaki, T. & Kino, H., 2004. Numerical atomic basis orbitals from H to Kr. *Physical Review B - Condensed Matter and Materials Physics,* 5.69(19).

Ozaki, T. et al., 2022. *User's Manual of OpenMX Ver. 3.9.* [Online] Available at: http://www.OpenMX-square.org

Peng, R. et al., 2020. Stacking-dependent topological phase in bilayer M B i2 T e4(M=Ge, Sn, Pb). *Physical Review B,* 3.101(11).

Perdew, J. P., Burke, K. & Ernzerhof, M., 1996. Generalized Gradient Approximation Made Simple. *Physical Review Letters,* 10.77(18).

Persson, K., 2014. *Materials Data on LaCl (SG:166) by Materials Project.* [Online] Available at: https://legacy.materialsproject.org/materials/mp-27929/#

Pizzi, G. et al., 2020. Wannier90 as a community code: New features and applications. *Journal of Physics Condensed Matter,* 4.32(16).

Powell, R. C., 2010. *Symmetry, Group Theory, and the Physical Properties of Crystals.* New York: Springer.

UNIVERSITAS
GADJAH MADA
**Kajian Komputasional Efek Transport Kuantum Anomali 2D Lanthanum Chloride dengan Pendekatan Numerik
Berbasis Density Functional Theory**
Arifia Pratiwi Nugraheni, Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.; Prof. Sholihun, S.Si., M.Sc., Ph.D.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Qi, X.-L., Wu, Y.-S. & Zhang, S.-C., 2006. Topological quantization of the spin Hall effect in two-dimensional paramagnetic semiconductors. *Phys. Rev. B,* 8, 74(8), p. 085308.

R. F. L. Evans, W. J. F. P. C. T. A. O. M. O. A. E. R. W. C., 2014. Atomistic spin model simulations of magnetic nanomaterials. *Journal of Physics: Condensed Matter,* 26(10).

Sawahata, H., Yamaguchi, N., Minami, S. & Ishii, F., 2023. First-principles calculation of anomalous Hall and Nernst conductivity by local Berry phase. *Physical Review B,* 1.107(2).

Shao, Y. et al., 2025. DFT Investigation of Strain-Controlled Magnetic Anisotropy in Electride [LaCl]2+·2e- Monolayers: Implications for Spintronic Applications. *ACS Applied Nano Materials,* 4, 8(13), pp. 6755-6762.

Siti Solihat, L. & Syariati, R., 2025. Bipolarity of large transverse thermoelectric effect in van der Waals ferromagnet semimetal lanthanum monochloride. *Journal of Applied Physics,* 3.137(12).

Sui, X., Wang, J., Yam, C. & Huang, B., 2021. Two-Dimensional Magnetic Anionic Electrons in Electrides: Generation and Manipulation. *Nano Letters,* 5, 21(9), pp. 3813-3819.

Sundaram, G. & Niu, Q., 1999. Wave-packet dynamics in slowly perturbed crystals: Gradient corrections and Berry-phase effects. *Physical Review B,* 59(23), pp. 14915-14925.

Sun, S., Weng, H. & Dai, X., 2022. Possible quantization and half-quantization in the anomalous Hall effect caused by in-plane magnetic field. *Physical Review B,* 12.106(24).

Tang, F., Po, H. C., Vishwanath, A. & Wan, X., 2019. Comprehensive search for topological materials using symmetry indicators. *Nature,* 2, 566(7745), pp. 486-489.

Tian, W., Yu, W., Shi, J. & Wang, Y., 2017. The property, preparation and application of topological insulators: A review. *Materials,* 7.10(7).

Tokura, Y., 2023. 10 years of the quantum anomalous Hall effect. *Nature Reviews Physics,* 8, 5(8), p. 439.

Vanderbilt, D. H., 2018. *Berry Phases in Electronic Structure Theory.* 1 ed. Cambridge: Cambridge University Press.

UNIVERSITAS
GADJAH MADA
**Kajian Komputasional Efek Transport Kuantum Anomali 2D Lanthanum Chloride dengan Pendekatan Numerik
Berbasis Density Functional Theory**
Arifia Pratiwi Nugraheni, Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.; Prof. Sholihun, S.Si., M.Sc., Ph.D.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Wan, B. et al., 2018. Identifying quasi-2D and 1D electrides in yttrium and scandium chlorides via geometrical identification. *npj Computational Materials,* 12.4(1).

Wang, Y. et al., 2023. Intrinsic magnetic topological materials. *Frontiers of Physics,* 4.18(2).

Wang, Z., Chen, K. & Lyu, S.-S., 2025. Substrate Effect on Electronic Band Structure and Topological Property in Monolayer V2O3 Magnetic Topological Insulator. 5.

Wantana, N. et al., 2024. Novel LaCl3:Yb2+ crystal scintillator for X-ray spectrometer. *Radiation Physics and Chemistry,* 11.Volume 224.

Wu, M., 2017. High-temperature intrinsic quantum anomalous Hall effect in rare Earth monohalide. *2D Materials,* 6.4(2).

Wu, Q. et al., 2018. WannierTools: An open-source software package for novel topological materials ☆. *Computer Physics Communications,* Volume 224, pp. 405-416.

Wu, X. et al., 2023. Robust quantum anomalous Hall effect with tunable magnetization directions and Chern numbers. *Physical Review B,* 9.108(11).

Wu, Y. et al., 2024. Layer-Dependent Quantum Anomalous Hall and Quantum Spin Hall Effects in Two-Dimensional LiFeTe. *ACS Applied Materials and Interfaces,* 8, 16(31), pp. 41371-41378.

Wu, Y. et al., 2024. Layer-Dependent Quantum Anomalous Hall and Quantum Spin Hall Effects in Two-Dimensional LiFeTe. *ACS Applied Materials and Interfaces,* 8, 16(31), pp. 41371-41378.

Xia, C. et al., 2018. PtSe2/graphene hetero-multilayer: Gate-tunable Schottky barrier height and contact type. *Nanotechnology,* 9.29(46).

Xiao, D., Yao, Y., Fang, Z. & Niu, Q., 2006. Berry-phase effect in anomalous thermoelectric transport. *Physical Review Letters,* 97(2).

Xue, F. et al., 2024. Tunable quantum anomalous Hall effects in ferromagnetic van der Waals heterostructures. *National Science Review,* 3.11(3).

Xu, Y. T. et al., 2024. The effect of lanthanum chloride on the electrocrystallization behavior of cobalt and grain refinement in deposition layers. *Journal of Applied Electrochemistry,* 4, 54(4), pp. 823-837.

Zhang, H. et al., 2016. Quantum anomalous Hall effect in stanene on a nonmagnetic substrate. *Physical Review B,* 12.Issue 23.

UNIVERSITAS
GADJAH MADA
**Kajian Komputasional Efek Transport Kuantum Anomali 2D Lanthanum Chloride dengan Pendekatan Numerik
Berbasis Density Functional Theory**
Arifia Pratiwi Nugraheni, Moh. Adhib Ulil Absor, S.Si., M.Sc., Ph.D.; Prof. Sholihun, S.Si., M.Sc., Ph.D.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Zhang, X. et al., 2024. Layer dependent topological phases and transitions in TaRhTe4: From monolayer and bilayer to bulk. *Physical Review Materials,* 9.8(9).

Zhao, H. P. et al., 2025. Observation of strain-modulated topological insulator and semimetal states in monolayer 1T′-MoTe2. *Applied Physics Letters,* 4.126(15).

Zhao, X., Guo, P. J., Ma, F. & Lu, Z. Y., 2023. Stacking-dependent topological quantum states in bilayer Mn2Cl3Br3. *Physical Review Research,* 7.5(3).

Zhou, X. et al., 2019. Fully Spin-Polarized Nodal Loop Semimetals in Alkaline Metal Monochalcogenide Monolayers. *Journal of Physical Chemistry Letters,* 6, 10(11), pp. 3101-3108.

Zhu, X. et al., 2026. Topological Phase Transition Driven by In-Plane Spin Rotation. *Nano Letters,* 6.