Aleksandr Rodin

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EDUCATION

- Ph.D. Physics, University of California, San Diego, 2012.
  Adviser: Professor Michael M. Fogler.
- M.S. Physics, University of California, San Diego, 2008.
- B.S. Physics, *magna cum laude*, University of Southern California, 2007.

PROFESSIONAL EMPLOYMENT

- **Assistant Professor**: Yale-NUS College, 2018-
- **Research Fellow**: Centre for Advanced 2D Materials, NUS, 2014-2018
- **Postdoctoral Researcher:** Department of Physics, Boston University, 2012-2014

TEACHING EXPERIENCE

- Lab Teaching Assistant, Spring 2011: Modern physics for physicists and engineers
- Lab TA Coordinator, Fall 2008 - Fall 2010: in charge of the physics for life sciences labs
- Lab Teaching Assistant, Spring 2008: Electricity and magnetism for life sciences
- Lab Teaching Assistant, Winter 2008: Modern physics for life sciences
- Lab Teaching Assistant, Fall 2007: Mechanics for life sciences
- USC MedCOR Mathematics facilitator, 2003-2007: teaching mathematics to middle- and high-school students.

RESEARCH INTERESTS

- Novel low-dimensional systems, heterostructures, and their applications
- Light-matter interaction
- Collective excitations
- Many-body effects

PUBLICATIONS

1. P. Z. Hanakata, **A. S. Rodin**, H. S. Park, D. K. Campbell, and A. H. Castro Neto, "Strain-induced gauge and Rashba fields in ferroelectric Rashba lead chalcogenide **Pb*X*** monolayers (***X*** = **S**, **Se**, **Te**)", Phys. Rev. B **97**, 235312 (2018)
2. **A. S. Rodin**, A. H. Castro Neto, "Localized magnetic states in two-dimensional semiconductors", Phys. Rev. B **97**, 235428 (2018)

3. S. Lin, A. Carvalho, S. Yan, R. Li, S. Kim, **A. S. Rodin**, L. Carvalho, E. M. Chan, X. Wang, A. H. Castro Neto, J. Yao,"Accessing valley degree of freedom in bulk Tin (II) sulfide at room temperature", Nat. Commun. **9** (1), 1455 (2018)

4. Z. Qiu, H. Fang, A. Carvalho, **A. S. Rodin**, Y. Liu, S. J. R. Tan, M. Telychko, P. Lv, J. Su, Y. Wang, A. H. Castro Neto, J. Lu, "Resolving the Spatial Structures of Bound Hole States in Black Phosphorus", Nano Lett. **17**, 6935 (2017)

5. P. Z. Hanakata, **A. S. Rodin**, A. Carvalho, H. S. Park, D. K. Campbell, A. H. Castro Neto, "Two-dimensional square buckled Rashba lead chalcogenides", Phys. Rev. B **96**, 161401 (2017)

6. **A. S. Rodin**, P. Z. Hanakata, A. Carvalho, H. S. Park, D. K. Campbell, A. H. Castro Neto, "Rashba-like dispersion in buckled square lattices", Phys. Rev. B **96**, 115450 (2017)

7. L. C. Gomes, P. E. Trevisanutto, A. Carvalho, **A. S. Rodin**, A. H. Castro Neto, "Strongly bound Mott-Wannier excitons in GeS and GeSe monolayers", Phys. Rev. B **94**, 155428 (2016)

8. A. Carvalho, M. Wang, X. Zhu, **A. S. Rodin**, H. Su, A. H. Castro Neto, "Phosphorene: from theory to applications", Nat. Rev. Mat. **1**, 16061 (2016)

9. L. Seixas, **A. S. Rodin**, A. Carvalho, A. H. Castro Neto, "Multiferroic Two-Dimensional Materials", Phys. Rev. Lett. **116**, 206803 (2016)

10. **A. S. Rodin**, L. C. Gomes, A. Carvalho, A. H. Castro Neto, "Valley Physics in Tin (II) Sulfide", Phys. Rev. B **93**, 045431 (2016)

11. Z. Fei, E. G. Iwinski, G.X. Ni, L. M. Zhang, W. Bao, **A. S. Rodin**, Y. Lee, M. Wagner, M. K. Liu, S. Dai, M. D. Goldflam, M. Thiemens, F. Keilmann, C. N. Lau, A. H. Castro Neto, M. M. Fogler, D. N. Basov, "Tunneling plasmonics in bilayer graphene", Nano Lett. **15**, 4973 (2015).

12. M. Wagner, Z. Fei, A. S. McLeod, S. J. Maddox, **A. S. Rodin**, W. Bao, E. G. Iwinski, Z. Zhao, M. Goldflam, M. Liu, G. Dominguez, M. Thiemens, M. M. Fogler, A. H. Castro Neto, C. N. Lau, S. Amarie, F. Keilmann, S. R. Bank, R. D. Averitt, D. N. Basov, "Infrared Pump-Probe Spectroscopy of Plasmons in Graphene and Semiconductors", Microscopy and Microanalysis **21**, 1415 (2015).

13. Jing Wu, Gavin Kok Wai Koon, Du Xiang, Cheng Han, Chee Tat Toh, Eeshan S Kulkarni, Ivan Verzhbitskiy, Alexandra Carvalho, **A. S. Rodin**, Steven P Koenig, Goki Eda, Wei Chen, A. H. Castro Neto, Barbaros Ozyilmaz, "Colossal Ultraviolet Photoresponsivity of Few-Layer Black Phosphorus", ACS nano **9**, 8070 (2015).

14. Michael. D. Goldflam, Guang-Xin Ni, Kirk W. Post, Zhe Fei, Yuting Yeo, Jun You Tan, **A. S. Rodin**, Brian C. Chapler, Barbaros Özyilmaz, A. H. Castro Neto, Michael M. Fogler, D. N. Basov, "Tuning and persistent switching of graphene plasmons on a ferroelectric substrate", Nano Lett. **15**, 4859 (2015).

15. Henrique B. Ribeiro, Marcos A. Pimenta, Christiano J. S. de Matos, Roberto Luiz Moreira, **A. S. Rodin**, Juan D. Zapata, Eunezio A. T. de Souza, A. H. Castro Neto, "Unusual angular dependence of the Raman response in black phosphorus", ACS nano (2015).

16. L. Seixas, **A. S. Rodin**, A. Carvalho, A. H. Castro Neto, "Exciton binding energies and luminescence of phosphorene under pressure", Phys. Rev. B **91**, 115437 (2015).

17. **A. S. Rodin**, A. H. Castro Neto, "Collective modes in anisotropic double layer systems", Phys. Rev. B **91**, 075422 (2015).

18. A. Carvalho, **A. S. Rodin**, A. H. Castro Neto, "Phosphorene Nanoribbons", EPL **108**, 47005 (2014).

19. Jing Wu, Gavin Koon, Du Xiang, Chee Tat Toh, Cheng Han, Ivan Verzhbitskiy, Alexandra Carvalho, **A. S Rodin**, Steven Koenig, Goki Eda, Wei Chen, Antonio Castro Neto , "Colossal Ultraviolet Photoresponsivity of Phosphorene", Submitted to Nature Nanotech. (2014).

20. **A. S. Rodin**, A. Carvalho, A. H. Castro Neto, "Excitons in anisotropic 2D semiconducting crystals", Phys. Rev. B **90**, 075429 (2014).

21. A. Avsar, J. Y. Tan, T. Taychatanapat, J. Balakrishnan, G. K. W. Koon, Y. Yeo, J. Lahiri, A. Carvalho, **A. S. Rodin**, E. C. T. O'Farrell, G. Eda, A. H. Castro Neto, B. Özyilmaz, "Spin-orbit proximity effect in graphene", Nature Comm. **5**, 4875 (2014).

22. H. T. Stinson, J. S. Wu, B. Y. Jiang, Z. Fei, **A. S. Rodin**, B. C. Chapler, A. S. McLeod, A. Castro Neto, Y. S. Lee, M. M. Fogler, and D. N. Basov, "Infrared nanospectroscopy and imaging of collective superfluid excitations in anisotropic superconductors". Phys. Rev. B **90**, 014502 (2014).

23. T. Low, **A. S. Rodin**, A. Carvalho, Y. Jiang, H. Wang, F. Xia, A. H. Castro Neto, "Tunable optical properties of multilayer black phosphorus". Phys. Rev. B 90, 075434 (2014).

24. **A. S. Rodin**, A. Carvalho, A. H. Castro Neto, "Strain-induced gap modification in black phosphorus", Phys. Rev. Lett. **112**, 176801 (2014).

25. S. Dai, Z. Fei, **A. S. Rodin**, W. Gannett, M. Wagner, W. Regan, A. S. McLeod, M. Liu, M. Thiemens, G. Dominguez, A. H. Castro Neto, A. Zettl, F. Keilmann, M. M. Fogler, D. N. Basov. "Infrared nano-imaging of surface phonon polaritons in a layered atomic crystal: a case study of boron nitride", Science **343**, 1125-1129 (2014).

26. M. Wagner, Z. Fei, A. S. McLeod, **A. S. Rodin**, W. Bao, E. G. Iwinski, Z. Zhao, M. D. Goldflam, M. K. Liu, G. Dominguez, M. Thiemens, M. M. Fogler, A. H. Castro Neto, C. N. Lau, S. Amarie, F. Keilmann, D. N. Basov, "Ultrafast and nanoscale plasmonic phenomena in exfoliated graphene revealed by infrared pump-probe nanoscopy", Nano Lett. **14**, 4529-4534 (2014).

27. **A. S. Rodin**, A. H. Castro Neto, "Excitonic collapse in semiconducting transition metal dichalcogenides", Phys. Rev. B **88**, 195437 (2013).

28. Z. Fei, **A. S. Rodin**, W. Gannett, S. Dai, W. Regan, M. Wagner, M. K. Kiu, A. S. McLeod, G. Dominguez, M.Thiemens, M. M. Fogler, A. H. Castro-Neto, F. Keilmann, A. Zettl, R. Hillenbrand, M. M. Fogler, D. N. Basov, "Electronic and plasmonic phenomena at grain boundaries in chemical vapor deposited graphene", Nature Nanotech. **8**, 821-825 (2013)

29. Z. Fei, **A. S. Rodin**, G. O. Andreev, W. Bao, A. S. McLeod, M. Wagner, L. M. Zhang, Z. Zhao, M. Thiemens, G. Dominguez, M. M. Fogler, A. H. Castro Neto, C. N. Lau, F. Keilmann, D. N. Basov, "Gate-tuning of graphene plasmons revealed by infrared nano-imaging", Nature **487**, 82-85 (2012).

30. **A. S. Rodin**, M. M. Fogler, "Hopping transport in systems of finite thickness or length", Phys. Rev. B **84**, 125447 (2011).

31. **A. S. Rodin**, M. M. Fogler, "Apparent power-law behavior of conductance in disordered quasi-one-dimensional systems", Phys. Rev. Lett. **105**, 106801 (2010).

32. **A. S. Rodin**, M. M. Fogler, "Numerical studies of variable-range hopping in one-dimensional systems", Phys. Rev. B **80**, 155435 (2009).

TALKS AND PRESENTATIONS

- Contributing talk at RPGR 2017, Singapore: "Quasi-Rashba Dispersion in Buckled Square Lattices"
- Contributing talk at APS March Meeting, 2017: "Dirac cones in square lattices"
- Invited talk at Graphene 2016, Genoa: "Electronic Properties of Transition Metal Monochalcogenides"
- Contributing talk at APS March Meeting, 2016: "Valley Physics in Tin (II) Sulfide"
- Invited talk at Graphene 2015, Bilbao: "Phosphorene: the New 2D Member"
- Invited talk at the Informal Phosphorene Symposium 2014: "Excitons in Anisotropic Semiconducting 2D Crystals"
- Seminar talk at National University of Singapore, 2013: "Graphene Plasmonics: Theory and Observation"
- Joint ONR/AFOSR Graphene MURI Review, 2012: "Observing Plasmons in Real Space"
- GRC Chemistry and Physics of Graphitic Carbon Materials, 2012: poster "Scattering theory for graphene plasmons near edges and interfaces"

- Contributing talk at APS March Meeting, 2012: "Scattering theory for graphene plasmons near edges and interfaces."
- Contributing talk at APS March Meeting, 2011: "Apparent Power-Law Behavior of Conductance in Disordered Quasi-One-Dimensional Systems."
- Contributing talk at APS March Meeting, 2010: "Numerical studies of variable-range hopping in one-dimensional systems."

SKILLS

Language Skills

Russian: native, English: fluent, Ukrainian: fluent, Croatian: proficient, Italian: proficient, Spanish: working knowledge.

Computer Skills

Matlab: proficient, Haskell: proficient, Elm: proficient, Julia: proficient, OCaml: working knowledge, Mathematica: working knowledge, C/C++: basic knowledge