

# Stanford

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## Hari Manoharan

Associate Professor of Physics

### Bio

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#### ACADEMIC APPOINTMENTS

- Associate Professor, Physics
- Principal Investigator, Stanford Institute for Materials and Energy Sciences

### Teaching

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#### COURSES

##### 2019-20

- Quantum Mechanics I: PHYSICS 130 (Win)

##### 2018-19

- Quantum Mechanics I: PHYSICS 130 (Win)

##### 2017-18

- Condensed Matter Seminar: APPPHYS 470 (Aut, Win, Spr)
- Light and Heat: PHYSICS 45 (Aut)
- Light and Heat Laboratory: PHYSICS 46 (Aut)

##### 2016-17

- Classical Mechanics Laboratory: PHYSICS 42 (Win)
- Quantum and Thermal Physics: PHYSICS 65 (Spr)

#### STANFORD ADVISEES

##### Doctoral Dissertation Reader (AC)

Prashant Kumar

##### Doctoral Dissertation Advisor (AC)

Morgan Brubaker, Tim Chen

### Publications

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#### PUBLICATIONS

- **Quantum engineered Kondo lattices.** *Nature communications*  
Figgins, J., Mattos, L. S., Mar, W., Chen, Y. T., Manoharan, H. C., Morr, D. K.

2019; 10 (1): 5588

- **Phase Separation of Dirac Electrons in Topological Insulators at the Spatial Limit** *NANO LETTERS*  
Parra, C., Rodrigues da Cunha, T. H., Contryman, A. W., Kong, D., Montero-Silva, F., Rezende Goncalves, P. H., dos Reis, D. D., Giraldo-Gallo, P., Segura, R., Olivares, F., Niestemski, F., Cui, Y., Magalhaes-Paniago, et al  
2017; 17 (1): 97-103
- **Activating and optimizing MoS2 basal planes for hydrogen evolution through the formation of strained sulphur vacancies** *NATURE MATERIALS*  
Li, H., Tsai, C., Koh, A. L., Cai, L., Contryman, A. W., Fragapane, A. H., Zhao, J., Han, H. S., Manoharan, H. C., Abild-Pedersen, F., Nørskov, J. K., Zheng, X.  
2016; 15 (1): 48-?
- **Optoelectronic crystal of artificial atoms in strain-textured molybdenum disulphide** *NATURE COMMUNICATIONS*  
Li, H., Contryman, A. W., Qian, X., Ardakani, S. M., Gong, Y., Wang, X., Weisse, J. M., Lee, C. H., Zhao, J., Ajayan, P. M., Li, J., Manoharan, H. C., Zheng, et al  
2015; 6
- **Optoelectronic crystal of artificial atoms in strain-textured molybdenum disulphide.** *Nature communications*  
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2015; 6: 7381-?
- **Stripe-like nanoscale structural phase separation in superconducting BaPb1-xBixO3.** *Nature communications*  
Giraldo-Gallo, P., Zhang, Y., Parra, C., Manoharan, H. C., Beasley, M. R., Geballe, T. H., Kramer, M. J., Fisher, I. R.  
2015; 6: 8231-?
- **Stripe-like nanoscale structural phase separation in superconducting BaPb(1-x)Bi(x)O3.** *Nature communications*  
Giraldo-Gallo, P., Zhang, Y., Parra, C., Manoharan, H. C., Beasley, M. R., Geballe, T. H., Kramer, M. J., Fisher, I. R.  
2015; 6: 8231-?
- **Unconventional molecule-resolved current rectification in diamondoid-fullerene hybrids** *NATURE COMMUNICATIONS*  
Randel, J. C., Niestemski, F. C., Botello-Mendez, A. R., Mar, W., Ndobashimiye, G., Melinte, S., Dahl, J. E., Carlson, R. M., Butova, E. D., Fokin, A. A., Schreiner, P. R., Charlier, J., Manoharan, et al  
2014; 5
- **Unconventional molecule-resolved current rectification in diamondoid-fullerene hybrids.** *Nature communications*  
Randel, J. C., Niestemski, F. C., Botello-Mendez, A. R., Mar, W., Ndobashimiye, G., Melinte, S., Dahl, J. E., Carlson, R. M., Butova, E. D., Fokin, A. A., Schreiner, P. R., Charlier, J., Manoharan, et al  
2014; 5: 4877-?
- **Artificial honeycomb lattices for electrons, atoms and photons** *NATURE NANOTECHNOLOGY*  
Polini, M., Guinea, F., Lewenstein, M., Manoharan, H. C., Pellegrini, V.  
2013; 8 (9): 625-633
- **Designer Dirac fermions and topological phases in molecular graphene** *NATURE*  
Gomes, K. K., Mar, W., Ko, W., Guinea, F., Manoharan, H. C.  
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- **Laser-Synthesized Epitaxial Graphene** *ACS NANO*  
Lee, S., Toney, M. F., Ko, W., Randel, J. C., Jung, H. J., Munakata, K., Lu, J., Geballe, T. H., Beasley, M. R., Sinclair, R., Manoharan, H. C., Salleo, A.  
2010; 4 (12): 7524-7530
- **TOPOLOGICAL INSULATORS A romance with many dimensions** *NATURE NANOTECHNOLOGY*  
Manoharan, H. C.  
2010; 5 (7): 477-79
- **Detection and Cloaking of Molecular Objects in Coherent Nanostructures Using Inelastic Electron Tunneling Spectroscopy** *NANO LETTERS*  
Fransson, J., Manoharan, H. C., Balatsky, A. V.  
2010; 10 (5): 1600-1604
- **Theory of Fano resonances in graphene: The influence of orbital and structural symmetries on STM spectra** *PHYSICAL REVIEW B*  
Wehling, T. O., Dahal, H. P., Lichtenstein, A. I., Katsnelson, M. I., Manoharan, H. C., Balatsky, A. V.  
2010; 81 (8)

- **Topological Insulator Nanowires and Nanoribbons** *NANO LETTERS*  
Kong, D., Randel, J. C., Peng, H., Cha, J. J., Meister, S., Lai, K., Chen, Y., Shen, Z., Manoharan, H. C., Cui, Y.  
2010; 10 (1): 329-333
- **Quantum holographic encoding in a two-dimensional electron gas** *NATURE NANOTECHNOLOGY*  
Moon, C. R., Mattos, L. S., Foster, B. K., Zeltzer, G., Manoharan, H. C.  
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- **Surface structure of cleaved (001) USb<sub>2</sub> single crystal** *PHILOSOPHICAL MAGAZINE*  
Chen, S. P., Hawley, M., Van Stockum, P. B., Manoharan, H. C., Bauer, E. D.  
2009; 89 (22-24): 1881-1891
- **Structure of Cleaved (001) USb<sub>2</sub> Single Crystal**  
Chen, S., Hawley, M., Van Stockum, P. B., Manoharan, H. C., Bauer, E. D., Moeck, P., Hovmoller, S., Nicolopoulos, S., Rouvimov, S., Petkov, Gateshki, M., Fraundorf, P.  
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- **Single-atom gating of quantum-state superpositions** *NATURE PHYSICS*  
Moon, C. R., Lutz, C. P., Manoharan, H. C.  
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- **Quantum phase extraction in isospectral electronic nanostructures** *SCIENCE*  
Moon, C. R., Mattos, L. S., Foster, B. K., Zeltzer, G., Ko, W., Manoharan, H. C.  
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- **Scanning optical homodyne detection of high-frequency picoscale resonances in cantilever and tuning fork sensors** *APPLIED PHYSICS LETTERS*  
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- **Information transport and computation in nanometre-scale structures** *Meeting on Organizing Atoms*  
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- **Scattering theory of Kondo mirages and observation of single Kondo atom phase shift** *PHYSICAL REVIEW LETTERS*  
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- **Tunable B=0 spin-splitting and its effect on the metallic behavior of GaAs two-dimensional holes** *PHYSICA E-LOW-DIMENSIONAL SYSTEMS & NANOSTRUCTURES*  
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- **Quantum mirages formed by coherent projection of electronic structure** *Nature*  
Manoharan, H. C., Lutz, C. P., Eigler, D. M.  
2000; 403 (6769): 512–15
- **The effect of spin splitting on the metallic behavior of a two-dimensional system** *SCIENCE*  
Papadakis, S. J., De Poortere, E. P., Manoharan, H. C., Shayegan, M., Winkler, R.  
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- **The effect of spin splitting on the metallic behavior of a two-dimensional system** *Science (New York, N.Y.)*  
Papadakis, S. J., Manoharan, H. C., Shayegan, M., Winkler, R.  
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Manoharan, H. C., Suen, Y. W., Santos, M. B., Shayegan, M.  
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- **Correlated insulating states of an interacting bilayer electron system**  
Manoharan, H. C., Suen, Y. W., Santos, M. B., Shayegan, M.  
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- **CHARGE-TRANSFER AT DOUBLE-LAYER TO SINGLE-LAYER TRANSITION IN DOUBLE-QUANTUM-WELL SYSTEMS** *PHYSICAL REVIEW B*  
KATAYAMA, Y., TSUI, D. C., MANOHARAN, H. C., PARIHAR, S., SHAYEGAN, M.  
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- **TIME-RESOLVED PHOTOLUMINESCENCE OF A 2-DIMENSIONAL HOLE SYSTEM IN THE EXTREME QUANTUM LIMIT** *PHYSICAL REVIEW B*  
KULIK, L. V., DOLGOPOLOV, V. T., SHASHKIN, A. A., DITE, A. F., BUTOV, L. V., KULAKOVSKII, V. D., MANOHARAN, H. C., SHAYEGAN, M.  
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- **WIGNER CRYSTAL VERSUS HALL INSULATOR** *PHYSICAL REVIEW B*  
MANOHARAN, H. C., SHAYEGAN, M.  
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- **ANOMALOUS TEMPERATURE-DEPENDENCE OF THE CORRELATED  $\nu=1$  QUANTUM HALL-EFFECT IN BILAYER ELECTRON-SYSTEMS** *PHYSICAL REVIEW B*

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  - **MAGNETOOPTICS OF 2-DIMENSIONAL HOLE SYSTEMS IN THE EXTREME QUANTUM LIMIT** *PHYSICAL REVIEW B*  
BUTOV, L. V., ZRENNER, A., SHAYEGAN, M., ABSTREITER, G., MANOHARAN, H. C.  
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  - **OBSERVATION OF AN ABRUPT DOUBLE-TO-SINGLE-LAYER TRANSITION IN A DOUBLE-QUANTUM-WELL STRUCTURE**  
KATAYAMA, Y., TSUI, D. C., MANOHARAN, H. C., SHAYEGAN, M.  
ELSEVIER SCIENCE BV.1994: 405–7
  - **ONE-COMPONENT TO 2-COMPONENT TRANSITIONS OF FRACTIONAL QUANTUM HALL STATES IN A WIDE QUANTUM-WELL**  
SUEN, Y. W., MANOHARAN, H. C., YING, SANTOS, M. B., SHAYEGAN, M.  
ELSEVIER SCIENCE BV.1994: 13–17
  - **SURFACE RESONANT-TUNNELING TRANSISTOR - A NEW NEGATIVE TRANSCONDUCTANCE DEVICE** *APPLIED PHYSICS LETTERS*  
KURDAK, C., TSUI, D. C., PARIHAR, S., SANTOS, M. B., MANOHARAN, H. C., LYON, S. A., SHAYEGAN, M.  
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  - **A NEW RESONANT-TUNNELING TRANSISTOR FABRICATED BY CLEAVED EDGE OVERGROWTH**  
KURDAK, C., TSUI, D. C., PARIHAR, S., MANOHARAN, H., LYON, S. A., SHAYEGAN, M., IEEE  
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  - **HIGH-LIFETIME STRAINED Si1-XGEX FILMS GROWN BY RAPID THERMAL CHEMICAL VAPOR-DEPOSITION**  
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  - **OPTICAL-PROPERTIES OF Si1-XGEX QUANTUM-WELLS AND SUPERLATTICES GROWN BY RAPID THERMAL CHEMICAL VAPOR-DEPOSITION**  
STURM, J. C., XIAO, MANOHARAN, H., SCHWARTZ, P. V., MOSLEHI, M. M., SINGH, R., KWONG, D. L.  
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STURM, J. C., SCHWARTZ, P. V., PRINZ, E. J., MANOHARAN, H.  
1991; 9 (4): 2011–16
  - **WELL-RESOLVED BAND-EDGE PHOTOLUMINESCENCE OF EXCITONS CONFINED IN STRAINED Si1-XGEX QUANTUM-WELLS** *PHYSICAL REVIEW LETTERS*  
STURM, J. C., MANOHARAN, H., LENCHYSHYN, L. C., THEWALT, M. L., ROWELL, N. L., NOEL, J. P., HOUGHTON, D. C.  
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