



budget I managed at Yeshiva University. The total grant award is \$1,450,282.

-2010: "Novel Electroporation Method Based on Cellular Resonant Modes" by Yehudit Fischer

**Teaching (undergraduate courses):**

Algebra based Introductory Physics, Calculus based Introductory Physics, Thermodynamics and Statistical Physics, Mathematical Physics, Classical Waves, Classical Mechanics

**Teaching (graduate courses):**

C\*-algebras and their K-Theory

**Academic Awards:**

- 2016: Keck Foundation award
- 2011: CAREER award from the National Science Foundation.
- 2008: Cottrell award from the Research Corporation for Science Advancement.
- 2005-2007: Princeton Center for Complex Materials Postdoctoral Fellowship.
- 2000-2003: Robert A. Welch Foundation fellowship.
- 2000: Chuoke Award for graduate academic and research performance, Rice University.!
- 1989: 6-th member of the Romanian team at the International Physics Olympiad.!
- 1989: Bronze Medal at the Romanian National Physics Olympiad competition.

**Referee services:**

I review a substantial number of papers for a variety of journals: Physical Review Letters, Nano Letters, Physical Review B, Journal of Chemical Physics, Micro & Nano Letters, Journal of the American Chemical Society, Journal of Physics: Condensed Matter, Optics Communications, Materials Chemistry and Physics, Journal of Mathematical Physics, Journal of Physics A: Mathematical and Theoretical, Mathematical Reviews, Communications in Mathematical Physics, Reviews in Mathematical Physics, Inventiones Mathematicae, Communications in Mathematical Sciences, Journal of Computational Physics, Archives of Rational Mechanics and Analysis, ESAIM: Control, Optimization and Calculus of Variations. I also review grant proposals from the National Science Foundation, Department of Energy and National Labs.

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**Memberships in professional associations:**

- American Physical Society (APS) since 2000.
- Society for Industrial and Applied Mathematics (SIAM) since 2010.

**Synergetics:**

- organizer of the meetings called "Blackboard Lectures in Condensed Matter Physics."
- I was Associate Editor for Topological Quantum Matter, an open access journal published by DeGruyter Open.

**Invited talks:**

**2016**

- 10 'The bulk-boundary principle for topological insulators,' Mathematical Physics Seminar, CUNY Graduate Center, New York, October 2016.
- 9 'The tale of two extraordinary identities,' talk for the conference "QMATH13: Mathematical results in quantum mechanics," Georgia Tech (Atlanta, US), October 2016.
- 8 'A computational non-commutative geometry program,' talk for the IGA/AMSI workshop "Topological matter, strings, K-theory, and related areas," U. of Adelaide (Australia), September 2016.
- 7 'The Anderson localization-delocalization transition in IQHE and topological insulators,'

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talk for the EMS-IMAP summer school in mathematical physics "Universality, Scaling Limits and Effective Theories," Roma (Italy), July 2016.

College, Oct 2013.

7 'Transport Characteristics of Molecular Wires,' Cond. Mat. Seminar, Rice University, March 2007.!

6 'Transport Characteristics of Molecular Wires,' Physics Colloquium, Univ. of New Hampshire, Feb. 2007.!

5 'Mapping the Braiding Properties of Non-Abelian Fractional Quantum Hall Liquids,' Physics Colloquium, Univ. of Washington St. Louis, Feb. 2007.

4 'DC conductance of molecular devices,' Physics Colloquium, Univ. of South Carolina, Feb. 2007.!

3 'DC conductance of molecular devices,' Physics Colloquium, Louisville Univ., Feb. 2007.!

2 'DC conductance of Long Molecular Wires,' Cond. Mat. Seminar, University of Missouri-Columbia, Jan. 2007.!

1 'Mapping the Braiding Properties of Non-Abelian Fractional Quantum Hall Liquids,' Physics Colloquium, Yeshiva Univ., Jan. 2007.

## 2006

2 'The Analytic Structure of Bloch Functions,' Mathematical Physics Seminar, Princeton University, November 2006.!

1 'Non-Equilibrium Dynamics of Electrons in Molecular Devices,' Physics Colloquium, New Jersey Inst. of Tech., Spring 2006.

## 2005

6 'New insight into the properties of periodic systems,' Physics Colloquium, New Jersey Inst. of Tech., Fall 2005.

5 'Periodic systems: New insight into their properties,' Cond. Mat. Seminar, Rice Univ., 2005.

4 'On the analytic structure of Bloch functions,' D. Vanderbilt's Seminar, Rutgers Univ., 2005.

3 'Nearsightedness of Electronic Matter: The basis for  $O(N)$  electronic structure calculations,' Cond. Mat. Seminar, Univ. of Southern California, 2005.

2 'Quantum mechanics with millions of atoms,' Physics Colloquium, Univ. of Texas, El Paso, 2005.!

1 'Nearsightedness of Electronic Matter,' Lawrence Livermore National Lab, 2005.

## 2004

1 'Nearsightedness of Electronic Matter,' Physics Colloquium, California State Univ. Northridge, 2004.

## Books:

1. E. Prodan and H. Schulz-Baldes, 'Bulk and Boundary Invariants for Complex Topological Insulators: From K-Theory to Physics,' (Mathematical Physics Studies, Springer, 2016) (<http://link.springer.com/book/10.1007/978-3-319-29351-6>)

## Peer reviewed publications:

### 2016

6 J. Kanter, J. Song and E. Prodan, Transport properties of graphene in the presence of disorder and magnetic fields: A finite-temperature Kubo-formula investigation, in preparation.

5 E. Prodan, Topological insulators at strong disorder, invited paper for the 2015 Congress on Mathematical Physics.

4 E. Prodan and H. Schulz-Baldes, Generalized Connes-Chern characters in KK-theory with an application to weak topological invariants, under review by Reviews in Mathematical Physics.

!

3 E. Prodan, Intrinsic Connes-Chern characters for crossed product algebras, under review by Journal of Operator Theory (<http://arxiv.org/abs/1501.03479>)

2 E. Prodan and H. Schulz-Baldes, Non-commutative odd Chern numbers and topological phases of disordered chiral systems, J. Func. Anal. **271**, 1150–1176 (2016).

1 E. Prodan and J. Bellissard, Mapping the current-current correlation function near a quantum critical point, Annals of Physics **368**, 1-15 (2016).

## 2015

3 E. Prodan, On the generalized Wannier functions, J. Math. Phys. **56**, 113511 (2015).

2 J. SOperator Theory (

Phase diagram and maps of the Z2 invariant, Phys. Rev. B **85**, 205136 (2012).

1 Z. Xu, L. Sheng, D.Y. Xing, E. Prodan and D.N. Sheng, Topologically protected extended states in disordered Quantum spin-Hall systems without time-reversal symmetry, Phys. Rev. B **85**, 075115 (2012).

## 2011

5 E. Prodan, Manifestly gauge independent formulations of the Z2 invariants, Phys. Rev. B **83**, 235115 (2011). (Editor's Suggestion)!

4 T. L. Hughes, E. Prodan and B. A. Bernevig, Inversion symmetric topological insulators, Phys. Rev. B **83**, 245132 (2011).!

3 E. Prodan, Three-dimensional phase diagram of disordered HgTe/CdTe quantum spin-Hall wells, Phys. Rev. B **83**, 195119 (2011). (Editor's Suggestion + Synopsis)



2 J. Wang, E. Prodan, R. Car and A. Selloni, Band alignment in molecular devices: Influence of anchoring group and metal work function, *Phys. Rev. B* **77**, 245443 (2008) [selected by Virtual J. Nanoscale Sci. & Techn.]

! E. Prodan and R. Car, Tunneling conductance of amine linked alkyl chains, *Nano Letters* **8**, 1771 (2008).

## 2007

1 E. Prodan and R. Car, DC Conductance of Molecular Wires, *Phys. Rev. B* **76**, 115102 (2007).

## 2006

3 E. Prodan, Nearsightedness of electronic matter in one dimension, *Phys. Rev. B* **73**, 085108 (2006).

2 E. Prodan, Analytic structure of Bloch functions for linear molecular chains, *Phys. Rev. B* **73**, 035128 (2006).!

1 E. Prodan, R. Garcia and M. Putinar, Norm estimates of complex symmetric operators applied to quantum systems, *J. Phys. A: Math. and Gen.* **39**, 389-400 (2006).

## 2005

2 E. Prodan and W. Kohn, Nearsightedness of electronic matter, *Proc. Natl. Acad. Sci.* **102**, 11635-11638 (2005).!

1 E. Prodan, Symmetry breaking in the self-consistent Kohn-Sham equations, *J. Phys. A: Math. and Gen.* **38**, 5647-5657 (2005).

## 2004

1 P. Nordlander and E. Prodan, Plasmon hybridization in nanoparticles near metallic surfaces, *Nano Lett.* **4**, 2209-2213 (2004).!

2 P. Nordlander, C. Oubre, E. Prodan, K. Li and M.I. Stockman, Plasmon hybridization in nanoparticle dimers, *Nano Lett.* **4**, 899-903 (2004).!

3 E. Prodan and P. Nordlander, Plasmon hybridization in spherical nanoparticles, *J. Chem. Phys.* **120**, 5444-5454 (2004).

## 2003

7 E. Prodan, C. Radloff, N.J. Halas and P. Nordlander, A hybridization model for the plasmon response of complex nanostructures, *Science* **302**, 419-422 (2003) [selected by Virtual J. Nanoscale Sci. & Techn.]!

6 E. Prodan, P. Nordlander and N.J. Halas, Electronic structure and optical properties of gold nanoshells, *Nano Lett.* **3**, 1411-1415 (2003).!

5 E. Prodan and P. Nordlander, Structural tunability of the plasmon resonances in metallic nanoshells, *Nano Lett.* **3**, 543-547 (2003).!

4 E. Prodan, N.J. Halas and P. Nordlander, Effects of dielectric screening on the optical properties of metallic nanoshells, *Chem. Phys. Lett.* **368**, 94-101 (2003).!

3 E. Prodan and P. Nordlander, On the Kohn-Sham equations with periodic background potentials, *J. Stat. Phys.* **111**, 967-992 (2003).

2 P. Nordlander and E. Prodan, Electronic structure and optical properties of metallic nanoshells, *Proc. SPIE* **5221**, 151-163 (2003).!

1 E. Prodan: Theoretical investigations of the electronic structure and optical properties of metallic nanoshells, PhD Thesis, Rice University, (2003).

## 2002

3 E. Prodan, Allen Lee and P. Nordlander, The effect of a dielectric core and embedding medium on the polarizability of metallic nanoshells, *Chem. Phys. Lett.* **360**, 325-332 (2002).!

