# Traffic Laws and Social Engineering for Electrons

David Goldhaber-Gordon
Professor, Physics

## CURRENT RESEARCH

### Studying and manipulating electrons as individuals and in collective settings

If the drivers on our highways were without traffic laws and allowed to go wherever they wanted, our roads would be snarled with traffic accidents and gridlock. Electrons, by nature, function like cars without traffic laws. Prof. David Goldhaber-Gordon, of Stanford, is looking at what works for traffic and incorporating those ideas to guide the design of quantum nanostructures to transport electrons efficiently. Inspired by divided highways, Dr. Goldhaber-Gordon is creating one-way structures and moving electrons through them to get them to their destination while minimizing resistance and wasted energy. This experimental research has the potential to create faster computer technology, lower energy costs, and make battery-charged technology like cell-phones last a full day between charging.

As befits an innovator in the studies of nanostructures and quantum electron devices, Dr. Goldhaber-Gordon's work has been cited over 5000 times in scientific journals . He pioneered use of quantum dots as model quantum systems. Recently, he's been inspired by the following questions:

- What if we could transmit current over long distances without resistance? Intel and other chip-makers can't make computer processors any faster, and soon won't be able to pack transistors closer together. One of the biggest challenges is creating wires ("interconnects") that have lower resistance than copper for a given length. Dr. Goldhaber-Gordon and his team are exploring ways to make wires whose resistance doesn't increase with length. Doing this has been possible for decades using cryogenic temperatures and high magnetic fields. The relevant phenomenon goes by the name "quantum Hall effect" and has won two Nobel...

Read More at benefunder.com/

## AFFILIATION

Stanford University

## EDUCATION

- Ph.D. in Physics 1999,Massachusetts Institute of Technology
- A.M. in History of Science 1994,Harvard University
- A.B. in Physics 1994,Harvard University

## AWARDS

- National Academy of Sciences Award for Initiative in Research, 2006
- Inaugural recipient of the George E. Valley Prize of the American Physical Society, 2002
- William McMillan Award, 2002
- Packard Fellow in Science and Engineering, 2004-2009
- Air Force Presidential (PECASE) Awardee, 2003-2007

## RESEARCH AREAS

Technology, Nanotechnology

## FUNDING REQUEST

Your contributions will support Dr. Goldhaber-Gordon's continued research on novel properties of electrons in low-dimensional or nanoscale systems, laying the foundations for new technologies. Funding will support graduate students and enable them to use cutting-edge shared nanofabrication and nanocharacterization labs. Funds will also assist with a new nano-microscope to map quantum electron flow and organization, or a new refrigerator to cool electrons to a thousandth of a degree above absolute zero.

Copyright © 2017 / Benefunder 4790 Eastgate Mall, Ste 125, San Diego, CA 92121 / info@benefunder.com / (858) 215-1136