CHRIS MALEC

PERSONAL INFORMATION

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WORK EXPERIENCE

2012–Present Postdoctoral Researcher, Naval Research Laboratory — Washington D.C.

Naval Research Laboratory

Researched fabrication techniques, measurement methods, and analysis of novel Domain Wall based memory devices.
Reference: Mark Johnson · +1 (202) 767 6265 · mark.b.johnson@nrl.navy.mil

2006–2011 Graduate Research Assistant, Georgia Institute of Technology — Atlanta

Georgia Tech

Conducted research into graphene devices as well as single nano particle based tunneling devices.
Reference: Dragomir Davidovic Davidović +1 (404) 385-1284 · dragomir.davidovic@physics.gatech.edu

2005-2006 Graduate Teaching Assistant, Georgia Institute of Technology — Atlanta

Georgia Tech

Oversaw labs, proctored and graded exams.
Reference: Andrew Zangwill +1 (404) 894 7333 · andrew.zangwill@gatech.edu

2004-2005 Mad Scientist, Mad Science of Atlanta — Atlanta

Mad Science

Brought engaging and fun science experiments to elementary and middle school students. Built and maintained stock of demonstration equipment for fellow Mad Scientists.
Reference: Jason Raines +1 (678) 392 1500

2001-2004 Research Assistant, UW - Madison — Madison

UW-Madison

Researched and built a tuning fork based probe to fit on the end of an AFM.
Reference: Mark Rzchowski +1 (608) 265 2876 · rzchowski@physics.wisc.edu

EDUCATION

2005-2011 Georgia Institute of Technology

PhD Physics

Thesis: *Transport in Graphene Tunnel Junctions*
Advisor: Dragomir Davidović

2000-2004 University of Wisconsin - Madison

B.S. Physics

In progress — Detection of Domain Wall Motion with a Semiconductor Device

A device made from an InAs SQW is used to detect the motion of a single Domain Wall in a patterned ferromagnet
Authors: C. E. Malec, Brian R. Bennett, Mark B.Johnson

In progress — Magneto-Transport of Graphene Nano Constrictions

Gated graphene devices are created with constrictions <300 nm. Transport is compared with that in bulk graphene on the same device.
Authors: C. E. Malec, Dragomir Davidović

January 2011 — Transport in Graphene Tunnel Junctions

Journal of Applied Physics

Fabrication, low temperature measurement, and modeling of solid state tunneling junctions fabricated from graphene and Al or Cu.
Authors: C. E. Malec, Dragomir Davidović

July 2011 — Electronic properties of Au-graphene contacts

Physical Review B

A novel fabrication method is used to study the effects of a clean Au-graphene interface.
Authors: C. E. Malec, D. Davidović

September 2011 — Evidence for incompressible in a metal-graphene tunnel junction in high magnetic field

Physical Review B - Rapid Communications

We observed the formation of Landau levels in low-doped Cu/graphene tunnel junctions
Authors: C. E. Malec, Dragomir Davidović

August 2011 — Vacuum-annealed Cu contacts for graphene electronics

Solid State Communications

We demonstrate a method of annealing Cu contacts to greatly reduce the resistance to graphene and perform a TLM analysis to quantify the improvement.
Authors: C. E. Malec, B. Elkus, D. Davidović

October 2007 — Saturation of spin-polarized current in nanometer scale aluminum grains

Physical Review B

We create a double tunnel junction between two Py leads and a 10nm Al nano particle. The spin current through the nano-particle at mK temperatures is found to saturate to a maximum value.
Authors: Y.G. Wei, C. E. Malec, D. Davidović

February 2008 — Modeling electron-spin accumulation in a metallic nanoparticle

Physical Review B

We present a model of spin accumulation in a nano-particle to explain our earlier observation in this system.
Authors: Y.G. Wei, C. E. Malec, D. Davidović

June 2009 — Spin-polarized electron tunneling through an aluminum particle in a noncollinear magnetic field

Physical Review B

We perform measurements of the spin-polarized current through an Al nano-particle in a noncollinear magnetic field. In contrast to the bulk system, we find that the Hanle effect is suppressed in a nano-particle
Authors: F.T. Birk, C. E. Malec, D. Davidović

PRESENTATIONS

Invited

2015 - Detecting Single Domain Walls with a Hall Sensor - Reed College Colloquium Series

2015 - The Detection and Simulation of Single Domain Wall Motion - University of the Pacific Colloquium Series

Contributed

2013 - Detection of Domain Wall Motion with a Semiconductor Device - 58th conference on MMM

2010 - Transport in graphene tunnel junctions - APS March Meeting

2009 - Spin transport in multilayer graphene devices - APS March Meeting

2008 - Fabrication of Spin Transport Devices in Graphite - 1st Southeast Conference for Soft Condensed Matter

2008 - Spin transport in nanometer scale aluminum particles - APS March Meeting

Internal

2014 - Using MuMax3 for GPU accelerated micromagnetic simulation - NRL seminar

2014 - Detection of Domain Wall Motion with a Semiconductor Device - NRL Postdoc collquium

2013 - Detection of Domain Wall Motion with a Semiconductor Device - Sigma Xi Post-doc poster session

2011 - Quantum Capacitance of graphene - Georgia Tech Physics Depaprtment's Epitaxial Graphene class

2010 - Transport in graphene tunnel junctions - Georgia Tech MRSEC graphene seminar

PATENTS

No. 8497499 - A method to modify the conductivity of graphene.
Inventors: Dragomir Davidovic, Walter A. de Heer, Christopher E. Malec

Provisional patent no. 61/907157 - A method of detecting Domain Walls in a nano magnet.
Inventors: Mark B. Johnson, Christopher E. Malec

SKILLS

Basic

Atomic Layer Deposition, Focused Ion Beam, Laser dicing, Raman microscopy, RF measurement

Intermediate

AFM/MFM, Ion Milling, Metal machining, Micromagnetic simulation, RIE/Plasma etching, Thin film sputter deposition, Profilometry, Python, Vibrating sample magnetometry, Wet chemical etching, Wire bonding

Advanced

Autocad, Cryogenic measurement, E-beam lithography, Electron microscopy, Igor, Instrument automation, LaTeX, Low-noise electronic measurement, High vacuum systems, Matlab/Octave, Microsoft Office, Probe station measurement, Superconducting magnet operation/fabrication, Thin film e-beam/thermal evaporation, UV lithography

OUTREACH AND OTHER ACTIVITIES

2014-2015 Postdoctoral Colloquium organizer

2013-2014 Science demonstrations with National Air and Space Museum

2009-2010 Graphene Journal Club organizer

2010 Condensed Matter Journal Club organizer

REFERENCES

Mark Johnson · mark.b.johnson@nrl.navy.mil · +1 (202) 767-6265

Dragomir Davidovic · dragomir.davidovic@gatech.edu · +1 (404) 385-1284

Joe Christodoulides · joseph.christodoulides@nrl.navy.mil · +1 (202) 767-4393

Jennifer McIntosh · mcintoshj@si.edu · +1 (703) 572-4113

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