

# CURRICULUM VITAE - Enrique del Barco

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## BACKGROUND

I am Professor of Physics at the University of Central Florida (UCF), in Orlando. I received my PhD from the University of Barcelona (Spain) in 2001. Postdoctoral stay in the physics department at New York University, under the supervision of Andrew Kent, before joining UCF in 2004.

## PREPARATION:

- 2002-2004    **POST-DOC: New York University**  
Postdoctoral Scientist in the NYU Magnetism Group.  
*Postdoctoral Advisor: Andrew Kent*
- 1996-2002    **University of Barcelona**  
- Ph.D.: Condensed Matter Physics – January 2001  
*Thesis Title: Quantum Coherence in Mesoscopic Magnetic Materials*  
*Ph-D Advisor: Javier Tejada*  
- B.S. Condensed Matter Physics – September 1996

## APPOINTMENTS:

- 2015 – Present:    **University of Central Florida:** Professor
- 2009 – 2015:    **University of Central Florida:** Associate Professor
- 2004 – 2009:    **University of Central Florida:** Assistant Professor
- 2002 – 2004:    **New York University:** Postdoctoral Associate.
- 2001 – 2001:    **University of Barcelona:** Researcher/assistant professor
- 1996 – 2001:    **University of Barcelona:** Graduate Research Assistant

## AWARDS:

- Apr. 2015:    2015 UCF *I-STEM* fellow
- Apr. 2015:    2015 UCF *Research Incentive* Award
- Apr. 2014:    2014 UCF *Rising for the Stars* Award
- Apr. 2011:    2011 UCF *Scholarship of Teaching and Learning* Award
- Apr. 2010:    2010 UCF *Research Incentive* Award
- Apr. 2010:    2010 UCF *Teaching Incentive Program* Award
- Apr. 2010:    2010 UCF *Excellence in Undergraduate Teaching* Award
- Jan. 2007:    US National Science Foundation CAREER award recipient
- Dec. 2003:    Prize. “*Best Thesis of the University of Barcelona in 2001*”.
- Apr. 2002:    Spanish Government Post-doctoral Fellowship
- Oct. 2001:    Extraordinary Doctoral Thesis Prize. University of Barcelona

## SERVICE ACTIVITIES

I am committed to returning the strong support that I have received from a number of public institutions since I started my scientific career. In order to do this, I devote a substantial amount of my time to public service at the local (UCF and public schools), national (Government agencies, several National Labs and other public institutions) and international levels (European agencies). I am actively involved in a number of organizational program committees for international conferences (APS, MMM/INTERMAG, ICMM) and workshops (QCPS). I am or have recently been regular member of advisory, user and review committees of National Laboratories (NHMFL, EMSL), and I actively participate as panelist/reviewer for government agencies (NSF, DOE), academic institutions and international journals.

### PROFESSIONAL SERVICE:

Conference and workshop Committees:	<p>Co-organizer of the Symposium “Molecular Materials for Quantum Computing”, EMRS-2015, Warsaw - Poland</p> <p>Co-organizer of the Focus Topic Session “Low-dimensional and molecular magnetism” at the 2014 American Physical Society (APS) March Meeting, Denver, March, 2014</p> <p>Member of the <i>Program Committee</i> for the 2013 <i>Magnetism and Magnetic Materials (MMM)-INTERMAG</i> Joint International Conference, Chicago, January 14-18, 2013</p> <p>Co-chair and host of the 2012 <i>International Conference of Molecular Magnetism</i>, Orlando – 7-11 October 2012. The only international conference in molecular magnetism, taking place biannually and alternating between America, Europe and Asia.</p> <p>Co-organizer of the Focus Topic Session “Low-dimensional and molecular magnetism” at the 2012 American Physical Society (APS) March Meeting, Dallas, March, 2012</p> <p>Co-chair and host of workshop “Quantum Coherent Properties of Spins III (Orlando-UCF, Dec-2010)”, 50 participants</p> <p>Member of the <i>Program Committee</i> for the 2010 <i>Magnetism and Magnetic Materials (MMM)</i> International Conference, Atlanta, November 14-18, 2010</p> <p>Founder and co-organizer of the annual workshop “Quantum Coherent Properties of Spins I (New Orleans, Dec-2008), II (Vancouver, CA Dec-2009)”</p>
Professional Committees:	<p>Member at Large of the “Electron Magnetic Resonance (EMR) Advisory Committee” of the National High Magnetic Field Laboratory, since July 2010 (two years appointment)</p> <p>Member of the “Environmental Molecular Sciences Laboratory (EMSL) Peer Review Panel” of the Pacific Northwest National Laboratory, since April 2010</p> <p>Member of the “Electron Magnetic Resonance (EMR) Peer Review Panel” of the National High Magnetic Field Laboratory, since September 2009</p>
Referees for journals:	Physical Review Letters, Physical Review B, Applied Physics: Condensed Matter, Nanoletters, Nature, Applied Physics Letters,

Journal of Low Temperature Physics, European Journal of Physics, European Journal of Inorganic Chemistry, Europhysics letters, Journal of Magnetism, Journal of the American Chemical Society, Inorganic Chemistry, Magnetic Materials, Dalton Transactions, Small, IEEE Trans. Magn., Nature Communications, Nature Scientific Reports. Inorganic Chemistry Frontiers.

Panelist and referee  
for Institutions:

NSF panelist: DMR Magnetism, Spring 2016  
NSF referee: DMR CAREER program, Fall 2014  
NSF MRSEC referee: Feb 2014  
International referee for the National Center for Science and Technology Evaluation of the Republic of Kazakhstan, since January 2013  
DOE referee: BES Theory, May 2012  
NSF panelist: ENG-ECCS, May 2012  
NSF panelist: DMR-Major Research Instrumentation, April 2012  
NSF referee: DMR-CM&Mat.Theory, Nov. 2011  
NSF referee: ENG-ECCS-EPDT, May 2010  
NSF panelist: DMR, April 2010  
NSF referee: DMR, December 2009  
NSF referee: "CAREER", September 2009  
NSF panelist: "CAREER", September 2008  
NSF referee: "Materials World Network", 2008  
Research Foundation: Flanders, Belgium, 2008  
City University of New York (internal program) 2007,2010  
NSF panelist: DMR-Materials World Network, February 2006

#### UNIVERISTY SERVICE:

Physics committees:

Multiple department committees. Including Outreach, Newsletter, Recruitment, Physical Science Building, UG curriculum and Graduate Program Committees, among others.

Chairman of the *Shared Facilities Committee* of the Physical Science building. During my appointment, I have assembled a state-of-the-art set of facilities which is now fully operative as open UCF user facilities. It includes a complete wafer nanofabrication clean room (with equipment donated by the Air Force Research Lab to del Barco and two other Physics faculty), a thin film evaporation and characterization laboratory, a microscopy laboratory (with AFM and SEM), and a Helium liquefier/recovery system serving all the labs in the Physical Science building, which has been obtained with support of the UCF College of Science upon negotiations lead by del Barco, after a failed proposal submitted to the NSF MRI program in 2008.

Chairman of the *Undergraduate Curriculum Committee* since Fall 2014.

UCF committees: *Dean's Advisory Committee*, 2013-2014  
*TIP Awards Committee*, COS, Spring 2014  
Consultant of Senior Design Projects in Electrical Engineering: 3) [Summer 2012]. *Project Title: Intellaturbine Students: Dwayne Smith, Joaquin Thompson, Timothy Knob and Jose Dominguez.* 2) [Spring 2012]. *Project Title: Hold Still Students: Tood Angell, Bryan Bugallo, Eric Jackson and Jose Lugo.* 1) [Spring 2008]. *Project Title: Martial Arts Training Tool (M.A.T.T) Students: Katie Carlson, Stephanie Mathieux, John Romeo and Damien White.*  
UCF ORC-ICubed Mentor of new NSF Career proposers / 2012  
*RIA Awards Committee*, COS, Spring 2011 and Spring 2012  
Multiple department committees. Including Outreach, Newsletter, Recruitment, Physical Science Building, Shared Facilities (chair), UG curriculum and Graduate Program Committees, among others.  
*COS Undergraduate Curriculum and Standards Committee*, 2007-2008  
*TIP Awards Committee*, CAS, Spring 2005

#### COMMUNITY SERVICE:

Public Schools: Hosted a high school science teacher, John Hoayun from Corner Lake Middle School, during the Summer 2011 semester. The instructor, with background in physics, learned about our research projects and got involved with my group students, as part of an initiative by the Faculty Center for Teaching and Learning.

Development of the interactive on-line blog “[www.highschoolscience.ucf.edu](http://www.highschoolscience.ucf.edu)” in collaboration with Hispanic high school students of the Orlando area and sponsored by NSF. One Hispanic student (Jesus Paredes) from the Lyman High School Engineering Institute joined our group in Summer 2008. Webpage was launched in Fall 2008.

Educational exchange program with Lake Highland Preparatory School to actively involve middle school students in science.

Educational exchange program with Donna Poniatowski, a Science Curriculum Specialist in the Education Support Center of the Seminole County, to foster the involvement of middle and high school students in scientific activities.

Collaborator and judge for the science fairs celebrated every year for elementary and middle school students at Montessori School at Tuskawilla, FL.

Science demonstrations for kids (Kinder Garden to 5<sup>th</sup> grade) at “Stenstron Elementary School”, Oviedo-FL, 2006, 2009 and 2011.

## EDUCATIONAL ACTIVITIES

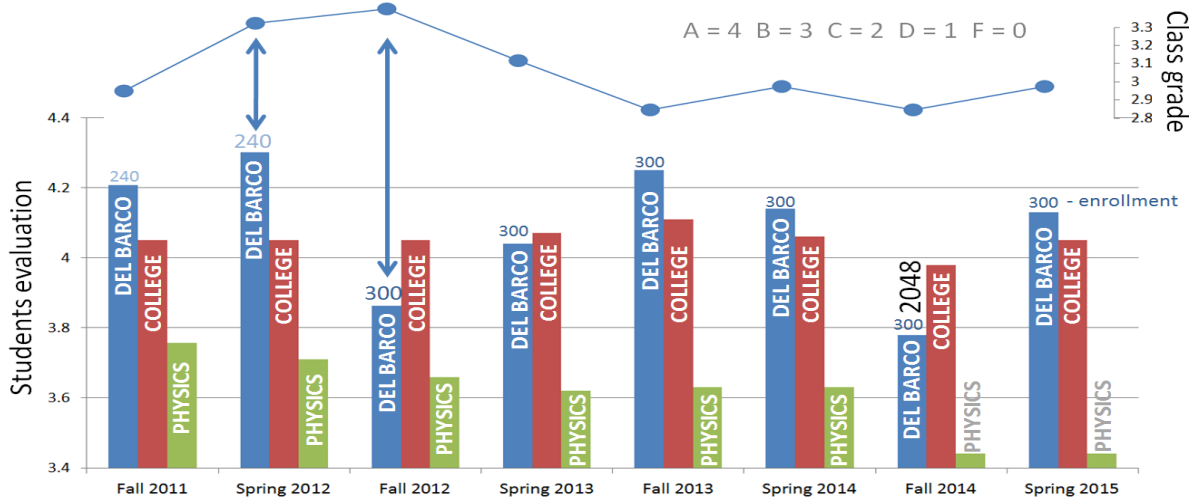
My teaching philosophy is strongly shaped by a *student-instructor interaction* strategy, which I use in my teaching activities at all levels. Interactive strategies are of paramount importance for the understanding of science, which is a crucial goal in basic training of STEM students. I implement this interaction strategy with students at all levels, from K-12, with whom I have developed an interactive scientific blog, to undergraduate and graduate students, who learn by explaining their study topics to *highschoolers*, and are trained in effectively disseminating their research activities (i.e. *service-learning*). My Physics Curriculum Development efforts have been supported by an NSF Award designed to make the lectures and instructional labs of introductory physics courses highly interactive. New laboratory activities (using *Real Time Physics*) and *Interactive Lecture Demonstrations* have been adopted in a series of PHY2048-49 courses as a result of this initiative. The initiative has been assessed and broadly disseminated, demonstrating substantial learning gains by students following our interactive instructional methodology, versus traditional instruction.

### FORMAL CLASSROOM TEACHING:

Courses Taught:

- Spring 2005: PHY2053 – College Physics I (90 students)
- Fall 2005: PHY2054 – College Physics II (92 students)
- Spring 2006: PHY2053 – College Physics I (90 students)
- Fall 2006: PHY2054 – College Physics II (85 students)
- Spring 2006: PHY2053 – College Physics I (94 students)
- Sum. 2007: PHY5817L – Building Physics Apparatus (5 stds.)
- Fall 2007: PHY2048 – Physics for Sci. and Eng. I (94 stds.)
- Spring 2008: PHY2049H – Physics for Sci. and Eng. II (20 stds.)
- Sum. 2008: PHY5817L – Building Physics Apparatus (5 stds.)
- Fall 2008: PHY2048 – Physics for Sci. and Eng. I
  - PHz4044 – Solid State Physics (3 credits) *New course*
  - PHz5405 – Condensed matter Physics (3 credits) *Grad.*
- Spring 2009: PHY2049 – Physics for Sci. and Eng. II (98 stds.)
- Sum. 2009: PHY5817L – Building Physics Apparatus (2 stds.)
- Fall 2009: PHY2048 – Physics for Sci. and Eng. I (210 stds.)
- Spring 2010: PHY2049 – Physics for Sci. and Eng. II (218 stds.)
- Summer 2010: PHY2049 – Physics for Sci. and Eng. II (90 stds.)
- Fall 2010: PHY2048 – Physics for Sci. and Eng. I (249 stds.)
- Spring 2011: PHY2049 - Physics for Sci. and Eng. II (250 stds.)
- Summer 2011: PHY2049 – Physics for Sci. and Eng. II (90 stds.)
- Fall 2011: PHY2049 – Physics for Sci. and Eng. II (250 stds.)
- Spring 2012: PHY2049 – Physics for Sci. and Eng. II (250 stds.)
- Fall 2012: PHY2049 – Physics for Sci. and Eng. II (250 stds.)
- Spring 2013: PHY2049 – Physics for Sci. and Eng. II (300 stds.)
- Fall 2013: PHY2048 – Physics for Sci. and Eng. I (300 stds.)
- Spring 2014: PHY2049 – Physics for Sci. and Eng. II (300 stds.)
- Fall 2014: PHY2048 – Physics for Sci. and Eng. I (230 stds.)
- Spring 2015: PHY2049 – Physics for Sci. and Eng. II (280 stds.)
- Fall 2015: PHZ3464 – Service-Learning Nanoscience II (12 stds.)
- Spring 2016: PHY2049 – Physics for Sci. and Eng. II (280 stds.)

Students Evaluations: My teaching evaluations by students have been consistently exceptional, as can be easily observed looking at the evaluation summaries attached to this section. To facilitate the assessment of the materials provided in this section, the upper figure shows the average evaluation of my “overall effectiveness as instructor” as extracted from the SPI summaries, while the figure below shows the same comparative data presented individually per semester (plus average class grade). In all these comparisons, the students consider my teaching skills to rank substantially above the average of the department, and above the COS average. Indeed, I usually obtain the best evaluations in the department. Note that calculus-based introductory physics courses are large-enrollment courses (240-300 students) required by most of the students taking them, and are considered extremely challenging courses. Note in the figure below that there is no correlation between grades and students’ ratings.



**STUDENTS ADVISING:**

Undergraduate Theses: Juan Carlos Gonzalez-Pons, *Magnetoresistance and Ferromagnetic Resonance Studies of NiPd nanowires and extended films*, Honors in the Major Thesis. Spring 2008

Master Theses: Alvar Rodriguez, *Development of an efficient molecular single-electron transport spectroscopy*, Master Thesis. Spring 2013

Firoze Haque, *Controlled deposition of magnetic molecules and nanoparticles on atomically flat gold surfaces*, Master Thesis. Summer 2008

Linda Smith, *Surface Characterization of Thin-film ZnO*, Master Thesis. Spring 2007.

Ph-D Theses: Simran Jeet Singh, *Dynamical Spin Injection in Graphene*, Ph-D thesis. Fall 2014

Asma Amjad, *Exchange coupling in molecular magnets: Zero,*

*one and three dimensions*, Ph-D thesis. Summer 2013

Hajrah Quddusi, *Role of internal degrees of freedom in the quantum tunneling of the magnetization in single-molecule magnets*, Ph-D thesis. Fall 2012

Firoze Haque, *Single-electron transport spectroscopy studies of magnetic molecules and particles*, Ph-D thesis. Spring 2010

John Henderson, *Single-molecule magnet based single-electron transistors*, Ph-D thesis. Summer 2009

Students supervised:

*Post-docs:*

Christopher M. Ramsey (2005-2007)

*Graduate students:*

Priyanka Vayda (2015-present)

Rebecca Cebulka (2015-present)

Marta Anguera (2012-present)

James Atkinson (2010-2016) Ph-D thesis, Spring 2016

Alvar Rodriguez (2010-2016) Ph-D thesis, Spring 2016

Simranjeet Singh (2008-2014) Ph-D thesis, Fall 2014

Asma Amjad(2008-2013) Ph-D thesis, Summer 2013

Hajrah M. Quddusi (2007-2013) Ph-D thesis, Fall 2012

Firoze H. Haque (2007-present) Master and Ph-D Theses, Summer 2008 and Spring 2010.

John J. Henderson (2006-2009) Ph-D thesis, Summer 2009

Linda Smith (2006-2007) Master thesis, Spring 2007

*Undergraduate students:*

Tyler Town (2014-present)

Chris Coleman (2014-present)

Brett Barin (2011-2013)

Mark A. Langhirt (2008-2013)

Mathew Arcuri (2008-2011)

Robert Agnese, REU (Summer 2009)

Bruce Chatman (2008-2009)

Geoff Bergman, REU student (Summer 2008)

Juan Gonzalez-Pons (2006-2008) Honors thesis, Spring 2008

Daniel Roig Canellas, international exchange (Summer2005)

*High-school students:*

Parker Coye (2013-present)

Morgan Marion (2009)

Jesus Paredes (2008-2012)

Austin Coye (2008-2010)

**STUDENTS AWARDS and RECOGNITIONS:**

- Spring 2016: Tyler Townsend (UG student)  
Prize: “2<sup>nd</sup> Place on Physical Science Category (\$500) - UCF Undergraduate Research Forum”
- Fall 2015: Marta Anguera (PhD student)  
Prize: “UCF Physics department Excellence in Teaching Assistance”
- Fall 2015: James Atkinson (PhD student)

## Enrique del Barco CV – RESEARCH ACTIVITIES

- Prize: “*UCF College of Science Excellence Award for Graduate Teaching Assistance*”
- Fall 2015: Rebecca Cebulka (PhD student)  
Prize: “*UCF Physics department Excellence in Teaching Assistance*”
- Spring 2015: James Atkinson (PhD student)  
Prize: “*UCF College of Science Excellence Award for Graduate Teaching Assistance*”
- Spring 2015: James Atkinson (PhD student)  
Prize: “*65<sup>th</sup> Lindau Nobel Laureate Meeting Awardee*”, Lindau, Germany.
- Spring 2015: James Atkinson (PhD student)  
Prize: “*GMAG Student Travel Award*,” to assist to the APS March Meeting.
- Spring 2014: Alvar Rodriguez (PhD students)  
Prize: “*UCF University Award for Excellence as a Graduate Teaching Assistant*”, with a cash prize of \$2,000. The highest recognition awarded to a GTA at UCF
- Spring 2014: Alvar Rodriguez (PhD students)  
Prize: “*UCF College of Science Excellence Award for Graduate Teaching Assistance*”
- Spring 2013: Simran Singh (PhD student)  
Prize: “*2013 MMM/Intermag Best Poster Award*”
- Spring 2012: Alvar Rodriguez and James Atkinson (PhD students)  
Prize: “*2012 Outstanding Physics Teaching Assistant Award* by AAPT (American Association of Physics Teachers)”
- Spring 2010: Austin Coye (K12)  
Prize: “*Winner of Best in Fair- Orange County Science Fair: Graphene-based three-terminal single-electron transistor*”
- Spring 2009: Juan Carlos Gonzalez-Pons (UG)  
Prize: UCF Founder’s Day Outstanding Thesis Award in Science and Engineering 2009 – Runner-Up: “*Honors in the Major Thesis: Geometrical Control of the Magnetization Direction in High-Aspect Ratio PdNi Ferromagnetic Nano-Electrodes*”.
- Spring 2009: Austin Coye (K12)  
Prize: “*4<sup>th</sup> place – Intel, International Science and Technology Fair: Transport studies of ferromagnetism in individual gold nanoparticles*”  
Prize: “*Winner of Best in Fair – Florida State Science and Technology Fair: Transport studies of ferromagnetism in individual gold nanoparticles*”  
Prize: “*Winner of the Physics Category - Orange County Science Fair: Transport studies of ferromagnetism in individual gold nanoparticles*”
- Fall 2008: John Henderson (PhD student)  
Second Prize at Nanoflorida 2008 nanoscale physics meeting”
- 2006-2007: John Henderson (PhD student)  
UCF I2 Lab fellow

## **SSCHOLARSHIP OF TEACHING AND LEARNING (SoTL): CURRICULUM DEVELOPMENT (CD) and PHYSICS EDUCATION RESEARCH (PER):**

- Grants: UCF I-STEM Fellowship (del Barco). Support for a GTA for one year (\$20,000) to assist in the implementation and assessment of



the Service-Learning courses forming the core of the new UCF Minor in Nanoscale Science and Technology.

Co-PI (50%) in a NSF Award entitled “Real Time Physics labs for UCF”, intended to improve the teaching methodology of courses PHY2048 and PHY2049.

Senior personnel in the NSF REU Award “Differential Equations in Quantum and Classical Physics”, which brought around 20 students to UCF during the Summers of 2008, 2009 and 2010.

Current Projects:

Creation of a new UCF Minor in Nanoscale Science and Technology build around three core courses which are being offered as Service-Learning. UCF students will collaborate with participating middle schools in the Orlando area to transfer the excitement about nanoscience and nanotechnology advances to K6-8 students in order to attract them to STEM fields. The first course was offered by del Barco in the Spring 2015, which includes a formal SoTL assessment of the initiative.

Renovation of the instructional laboratories of calculus-based courses (PHY2048 and PHY2049). The project consists in using Webassign as a platform to support the laboratory experiments, including pre-, post- and in-lab activities, quizzes and automatic grading. In collaboration with Elena Flitsiyan. Project started in Summer 2011. Project implementation completed in Fall 2012. Assessment activities completed in 2015, with an article summarizing the results submitted in Fall 2015.

Two of my graduate students have received the “2012 *Outstanding Physics Teaching Assistant Award*” by the AAPT (American Association of Physics Teachers) for their assistance in this project. These students have also been recognized with several teaching awards at UCF (see *Students’ Awards and Recognition*).

Other Activities:

Creation with Amy Zeh (Office of Experiential Learning) of a Service-Learning Workshop at UCF. Project development: Create a Service-Learning Minor in Nanoscale Science and Nanotechnology at UCF.

Attendance to the 2011 Webassign Users Group Workshop. Project development: Implementation of on-line labs for calculus-based physics courses at UCF.

Project development: Service-Learning graduate physics courses at “UCF Summer Faculty Development Conference 2011”, organized by the Faculty Center for Teaching and Learning. May 2011.

Participated in the “Engaging STEM Course Innovation Project”, organized by the Faculty Center for teaching and Learning. January-April 2011.

Attendance to a physics education workshop (Spring 2010): “LivePhoto Physics Faculty Workshop (LPPFW)” University of Central Florida on January 5<sup>th</sup>—7<sup>th</sup>, 2010

Participated in the “Large Class Management Course Innovation

Project”, organized by the Faculty Center for teaching and Learning. October-November 2010.

Attendance to a physics education workshop (Summer2008):  
“Activity Based Physics Faculty Institute (ABPFI)”  
Dickinson College, June 15-20, 2008. Carlisle, PA

### SoTL PUBLICATIONS:

*UCF-related students highlighted in blue. (HS) High school student.*

- 4) **J. H. Atkinson**, **A. R. Garrigues**, W. James, E. Flitsiyan, J. J. Chini, and **E. del Barco**  
“Impact of the Introduction of Web-based Materials on Student Performance and Instruction in Undergraduate Introductory Physics Courses”  
*Phys. Edu.*, under review (2016).
- 3) **R. Cebulka**, **E. del Barco**  
“Assessment of the Effect of Service-Learning in Nanoscience on Student's Depth of Learning and Critical Thinking”  
*Michigan Journal of Community Service Learning*, under review (2016).
- 2) C. Efthimiou, **D. Maronde**, **T. McGreevy**, **E. del Barco** and S. McCole  
“Implementing Elements of The Physics Suite at a large metropolitan research university”  
*Phys. Edu.***46**, 421-429 (2011).
- 1) **J. Paredes (HS)** and **E. del Barco**  
“An Interactive Science Blog at University of Central Florida for High School Science Students”  
*The Physics Teacher* **48**, 506 (2010).

### PCD/SoTL PRESENTATIONS:

- E. del Barco, Florida AAPT Conference November 2015, Orlando. *A Service-Learning Minor in Nanoscale Science and Technology – Increasing enrollment in STEM*
- J. Atkison, A. Rodriguez, E. Flitsiyan and E. del Barco, Florida AAPT Conference November 2015, Orlando. *Webassign support for Calculus-based Introductory Physics Courses at UCF*
- J. Atkison, A. Rodriguez, J. Chini, E. Flitsiyan and E. del Barco, WAUG 2013, Baltimore. *Webassign support for Calculus-based Introductory Physics Courses at UCF*
- E. del Barco, WAUG 2011, Baltimore. *Projecting Webassign support for Calculus-based Introductory Physics Courses at UCF*
- C. Efthimiou, D. Maronde, T. McGreevy, S. McCole and E. del Barco, Faculty Showcase 2009, UCF – Orlando, FL. *Real Time Physics at UCF*
- C. Efthimiou and E. del Barco, AAPT Summer Meeting 2009 – Ann Arbor, MI. *Interactive Lecture Demonstrations: A First Attempt at UCF*
- C. Efthimiou, D. Maronde, T. McGreevy, S. McCole and E. del Barco, APS March Meeting 2009 – Pittsburgh, PA. *Real Time Physics at UCF*
- 7<sup>th</sup> Workshop on Nanomagnetism and Superconductivity, July 2011, Coma-Ruga, Barcelona, Spain - *Internal degrees of freedom and quantum tunneling of the magnetization in single-molecule magnets.*
- C. Efthimiou, D. Maronde, S. McCole T. McGreevy, E. del Barco, AAAS Course, Currículo and Laboratory Improvement (CCLI) Conference 2008 – Washington D.C. *Real Time Physics at UCF*

C. Efthimiou, D. Maronde, S. McCole T. McGreevy, E. del Barco, AAPT Physics Education Research Conference 2008 – Edmonton. *Real Time Physics at UCF*

**PRESENTATIONS BY/FOR K-12 STUDENTS:**

A. Coye, Orange County Science Fair, March-2009 – Orlando, FL. *Transport studies of ferromagnetism in individual gold nanoparticles*

A. Coye, Florida State Science and Technology Fair, April-2009 – Tallahassee, FL. *Transport studies of ferromagnetism in individual gold nanoparticles*

A. Coye, Intel, International Science and Technology Fair, June-2009 – Reno, OH. *Transport studies of ferromagnetism in individual gold nanoparticles*

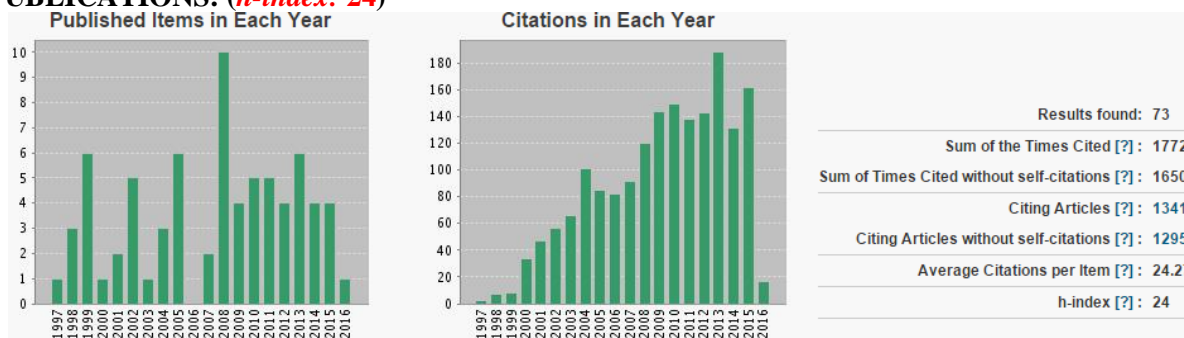
J. Paredes, School Name, March 2009 – Orlando, FL. *UCF Highschool Science Blog*

J. Henderson, SECME Awards Dinner, March 2009 – Orlando, FL. *Single-molecule magnet based single-electron transistors*

## RESEARCH ACTIVITIES

My primary research interest is focused on the study of how the microscopic laws of physics – quantum mechanics– manifest themselves at a macroscopic scale. Nanoscale magnetic systems are excellent candidates for these studies due to the fact that size-tuning allows crossing the frontier between the quantum and classical *worlds*. My systems of interest include molecular nanomagnets, magnetic nanoparticles and nanostructures. The fundamental understanding of the quantum properties of nanoscale magnetic materials will lead to break-grounding applications in emerging technologies. Quantum control of the magnetization in magnetic molecules and nanostructures will greatly impact molecular spintronics and quantum information and computation technologies. My research has produced seminal contributions to the field of molecular magnetism, having published more than 40 peer-reviewed publications in high impact-factor journals since I joined UCF, including three articles in *Physical review Letters* and one in *Nature Physics*. These results have allowed the establishment of important international collaborations, and have been recognized by multiple invited talks at conferences and institutions around the world. My work has produced more than 1500 citations (~1000 while at UCF), with an *h*-index 23.

### PUBLICATIONS: (*h*-index: 24)



Data extracted from ISI Web of Science on 8/15/2014

### BOOKS / BOOK CHAPTERS

#### *A Microscopic and Spectroscopic View of Quantum Tunneling of Magnetization*

Junjie Liu, **Enrique del Barco** and Stephen Hill

Chapter of the in-press book: “Molecular magnets. Physics and applications”, Edited by Fernando Luis, Juan Bartolome and Julio Fernandez. Springer (2013).

### JOURNALS / PEER REVIEWED

*Del Barco's students highlighted in blue. (UG) Undergraduate student.*

- 80) **James H. Atkinson**, Adeline Fournet, Lakshmi Bhaskaran, Yuri Myasoedov, Eli Zeldov, **Enrique del Barco**, Stephen Hill, George Christou, and Jonathan Friedman, “The Effects of Orthogonal Uniaxial Pressures on the Quantum Tunneling of Magnetization in a Mn12 Single Molecule Magnet” Phys. Rev. B. under review (2016)
- 79) **A. Amjad**, J. M. Clemente-Juan, E. Coronado, F. Luis, M. Evangelisti, G. Mínguez Espallargas, and **E. del Barco**, “Tunable Crossover between One- and Three-Dimensional Magnetic Dynamics in CoII Single-Chain Magnets Organized by Halogen Bonding” Phys. Rev. B. under review (2016)
- 78) **A. R. Garrigues**, L. Yuan, L. Wang, E. R. Mucciolo, D. Thompon, **E. del Barco**, and C. A.

- Nijhuis,  
 “A Single-Level Tunnel Model to Account for Electrical Transport through Single Molecule- and Self-Assembled Monolayer-based Junctions”  
 Nature Sci. Rep. in press (2016)
- 77) **A. R. Garrigues**, L. Wang, **E. del Barco**, and C. A. Nijhuis,  
 “Electrostatic Control over Temperature-Dependent Tunneling across a Single Molecule Junction”  
 Nature Comm. in press (2016)
- 76) **S. Singh**, **M. Anguera**, **E. del Barco**, R. Springell, and C. W. Miller,  
 “Moderate positive spin Hall angle in uranium”  
 Appl. Phys. Lett. **107**, 232403 (2015)
- 75) **S. Singh**, A. Ahmadi, C. T. Cherian, E. R. Mucciolo, **E. del Barco**, and B. Özyilmaz,  
 “Dynamical spin injection at a quasi-one-dimensional ferromagnet-graphene interface”  
 Appl. Phys. Lett. **106**, 032411 (2015)
- 74) Li Yuan, Nisachol Nerngchamnon, Cao Liang, Hicham Hamoudi, **Enrique del Barco**, Max Roemer, Ravi K. Sriramula, Damien Thompson, and Christian A. Nijhuis,  
 “Controlling the direction of rectification in a molecular diode”  
 Nature Comm. **6**, 6324 (2015)
- 73) M. D. Jenkins, U. Naether, M. Ciria, J. Sesse, **J. H. Atkinson**, C. Sanchez-Azqueta, **E. del Barco**, Johannes Majer, David Zueco, and Fernando Luis,  
 “Nanometric constrictions in superconducting coplanar waveguide resonators”  
 Appl. Phys. Lett. **105**, 162601 (2014)
- 72) **J. H. Atkinson**, R. Inglis, **E. del Barco**, and E. K. Brechin.  
 “Three-Leaf Quantum Interference Clovers in a Trigonal Single-Molecule Magnet”  
*Phys. Rev. Lett.*, **113**, 087201 (2014).
- 71) D. Panjwani, M. Yesiltas, **S. Singh**, **E. Del Barco**, R.E. Peale, C. Hirschmugl, J. Sedlemair  
 “Stencil lithography of gold-black IR absorption coatings”  
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**PATENTS:** Gonzalez Garcia was my previous official name (del Barco in publications)

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A. D. Kent, **E. Gonzalez Garcia** and B. Ozyilmaz. US Patent number 6,980,469 issued December 27, 2005, entitled “High speed low power magnetic devices based on current induced spin-momentum transfer”

A. D. Kent, **E. Gonzalez Garcia** and B. Ozyilmaz. US Patent number 7,170,778 issued January 30, 2007, entitled “High speed low power magnetic devices based on current induced spin-momentum transfer”

A. D. Kent, **E. Gonzalez Garcia** and B. Ozyilmaz. Canadian Application Number 2535965, filed February 14, 2006, entitled “entitled “High Speed Low Power Magnetic Devices Based Current Induced Spin-Momentum Transfer”

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**PRESENTATIONS:** (Since 2002)

**Invited Conference Presentations:** (Since 2002)

International Conference of Molecular Magnetism (ICMM) 2014 –July 2014, St. Petesburg, Russia – *Three-leaf quantum interference clovers in a single-molecule magnet*.

Current Trends in Molecular and Nanoscale Magnetism – May 2014, Larcana, Cyprus – *Three-leaf quantum interference clovers in a single-molecule magnet*.

APS March Meeting 2014 –March 2014, Denver – *Three-leaf quantum interference clovers in a single-molecule magnet*.

SPIE Optics and Photonics – Spintronics Symposium, August 2013, San Diego, CA – Dynamical

*Spin Pumping at Ferromagnet/Graphene Interfaces.*

MMM/Intermag 2013, January 2013, Chicago, IL – *Quantum Tunneling of the Magnetization in Molecular Magnets: A Microscopic View.*

7<sup>th</sup> Workshop on Nanomagnetism and Superconductivity, July 2011, Coma-Ruga, Barcelona, Spain - *Internal degrees of freedom and quantum tunneling of the magnetization in single-molecule magnets.*

Quantum Coherent Dynamics of Spins III Workshop, December 2010, Orlando, FL - *Internal degrees of freedom and quantum tunneling of the magnetization in single-molecule magnets.*

Current Trends in Molecular Nanomagnetism, June 2010, Orlando, FL- *Nanospintronics with Molecular Magnets.*

Quantum Coherent Dynamics of Spins II Workshop, December 2009, Vancouver, CANADA - *The role of Dzialowszinski-Moriya interaction in as molecular nanomagnet with inversion symmetry.*

European Conference of Molecular Magnetism (ECMM), October 2009, Wroclaw, POLAND-*The role of Dzialowszinski-Moriya interaction in as molecular nanomagnet with inversion symmetry.*

University of Valencia Brainstorming Meeting on Molecular Nanomagnetism, June 2009, Valencia, SPAIN- *Magnetic Single-Electron Transistors.*

CONSOLIDER - Symposium on Molecular Magnetism, June 2009 – Miraflores de la Sierra (Madrid) SPAIN. *Magnetic Single-Electron Transistors.*

UCF/IEEE Photonics Society Workshop on Quantum Information Processing, Spring Meeting 2009 – Orlando, FL. *Quantum interference between two exchange-couple quantum tunneling spins.*

APS March Meeting 2009 – Pittsburg, PA. *The Role of Antisymmetric exchange on the quantum interference between states of different spin length in a dimeric molecular magnet.*

Symposium on Spin Physics and Nanomagnetism 2009 – CUNY, New York, NY. *The Role of Antisymmetric exchange on the quantum interference between states of different spin length in a dimeric molecular magnet.*

SEMRC Conference 2008 – Tallahassee, FL. *Magnetically dilute crystals of antiferromagnetic molecular rings for quantum computing –an EPR study.*

MMM Conference 2008 – Austin, TX. *Quantum Interference in the Longitudinal Oscillations of the Total Spin of a Dimeric Molecular Nanomagnet*

International Conference of Nanomagnetism 2007 – Coma-Ruga, Spain. *Energy relaxation between low lying split spin-states of the single molecule magnet Ni<sub>4</sub>*

International workshop: New trends in molecular magnetism 2006 – Santorini, Greece. *Single-molecule magnet based single-electron transistors*

International Workshop in Nanomagnetism 2006 – Comarruga, Spain. *Single-molecule magnet based single-electron transistors*

ISCOM 2005 – Keywest, FL. *Microwave Studies of Superposition States in Single-Molecule Magnets*

International Workshop in Nanomagnetism 2005 – Comarruga Spain. *Microwave and Magnetic Studies of High-Spin Superposition States in Ni<sub>4</sub>*

AVS 2005 – Orlando FL. *Quantum dynamics of the magnetization in single-molecule magnets*

APS March Meeting 2004 – Montreal-Canada. *Quantum coherence in SMM Ni<sub>4</sub>: Magnetic and microwave studies*

QAMTS 2003 – Gainesville FL. *Quantum splittings distribution in Mn<sub>12</sub>-acetate SMM*

**University Colloquia:**

Universidad de Barcelona, Physics Department, July 2015, Barcelona, Spain – *Dynamical Spin Injection in Graphene*

Universidad de Zaragoza, July 2015, Zaragoza, Spain – *Dynamical Spin Injection in Graphene*

Universidad Autonoma de Madrid, Physics Department, July 2015, Madrid, Spain – *Dynamical Spin Injection in Graphene*

National university of Singapore, Chemistry Department, June 2015, Singapore – *Single-electron transport studies of individual molecular rectifiers*

Universidad Autonoma de Madrid, Physics Department, July 2015, Madrid, Spain – *Quantum Tunneling of the Magnetization in Molecular Magnets: A Microscopic View*

National university of Singapore, Chemistry Department, June 2015, Singapore – *Single-electron transport studies of individual molecular rectifiers*

University of South California, Physics Department, April 2014, Los Angeles, CA – *Quantum Tunneling of the Magnetization in Molecular Magnets: A Microscopic View*

Amherst College, Physics Department, February 2014, Amherst, MA – *Quantum Tunneling of the Magnetization in Molecular Magnets: A Microscopic View*

City College - City University of New York, Physics Department, November 2013 – New York – *Quantum Tunneling of the Magnetization in Molecular Magnets: A Microscopic View*

New York University, Physics Department, November 2013 – New York – *Quantum Tunneling of the Magnetization in Molecular Magnets: A Microscopic View*

Tokyo University, Physics Department, July 2013 – Tokyo, Japan – *Nanospintronics with single-molecule magnets*

National University of Singapore, Physics Department, June 2013 – Singapore – *Nanospintronics with single-molecule magnets*

Virginia Tech, Physics Department, September 2011 – Blacksburg, VA – *Spintronics with molecular magnets*

Florida Atlantic university, Physics Department, November 2010 – Boca Raton, FL – *Spintronics at the single-molecule level*

University of Freiburg, Physics Department, June 2009 – Freiburg, Germany – *The Role of DM Interaction of the Quantum Tunneling of the Magnetization*

SACLAY, Magnetism group, June 2009 – Paris, France. *Magnetic Single-Electron Transistors*

University of Central Florida, Chemistry department 2008 – *Single-molecule magnet based single-electron transistors*

University of Florida, Physics department 2006 – Gainesville, FL. *Single-molecule magnet based single-electron transistors*

University of Barcelona, Physics department 2006 – Barcelona, Spain. *Single-molecule magnet based single-electron transistors*

University of Zaragoza, Physics department 2006 – Zaragoza, Spain. *Single-molecule magnet based single-electron transistors*

University of Valencia, Inorganic chemistry department 2006 – Valencia, Spain. *Single-molecule magnet based single-electron transistors*

University of Nebraska, physics department 2006 – Lincoln, NE. *Single-molecule magnet based single-electron transistors*

University of Barcelona 2004 – Barcelona-Spain. *Quantum coherence in SMM Ni<sub>4</sub>: Magnetic and*

*microwave studies*

### Contributed Conference/Meeting Presentations:

Marta Anguera Antoñana, Cheng Fang, Song Peng, Jaume Veciana, Christian Nijhuis, Jens Martins and Enrique del Barco, Florida Inorganic and Materials Symposium – October 2015, Gainesville, USA. *Electronic transport through PTM radical molecules using Scanning Tunneling Spectroscopy.*

M. D. Jenkins, U. Naether, M. Ciria, J. Sesé, M. C. Pallarés, A. Lostao, J. Atkinson, C. Sánchez-Azqueta, E. del Barco, J. Majer, D. Zueco, J. L. García-Palacios, and F. Luis, XXXV Meeting of the Spanish Physics Society– Summer 2015, Gijon, Spain. *Nanoscale constrictions in superconducting coplanar waveguide resonators: first attempts to perform circuit QED with small spin ensembles.*

James H. Atkinson, Anton Jesche, Michael Baker, Enrique del Barco, Myriam Sarachik, Paul Canfield, APS March Meeting, March 2015 – San Antonio. *Magnetization studies and spin Hamiltonian modelling of  $\text{Li}_2(\text{Li}_{1-x}\text{Fe}_x)\text{N}$ .*

James H. Atkinson, Adeline Fournet, Lakshmi Bhaskaran, Yuri Myasoedov, Eli Zeldov, Stephen Hill, Enrique del Barco, Jonathan Friedman, George Christou, APS March Meeting, March 2015 – San Antonio. *Uniaxial-pressure dependence of the magnetization dynamics in the high-symmetry single-molecule magnet  $\text{Mn}_{12}\text{-MeOH}$ .*

B. Barin, S. Singh, A. Prata, B. Ozyilmaz and E. del Barco, Society of Physics Students – Zone 6 Meeting – April 2013, Orlando. *Enhanced Gilbert damping at Permalloy/graphene interfaces.*

J. Atkinson, R. Inglis, E. Brechin, and E. del Barco, APS March Meeting, March 2014 - Denver. *Three-fold angular modulation of the tunnel splittings in a trigonal  $\text{Mn}_3$  single-molecule magnet.*

S. Singh, A. Prata, B. Barin, B. Ozyilmaz and E. del Barco, APS March Meeting 2013 – Baltimore. *Enhanced Gilbert damping at Permalloy/graphene interfaces.*

A. Amjad, E. del Barco, S. Hill, A. Ozarowski, J. Van Tol and M. Ali, APS March Meeting 2013 – Baltimore. *High Field Electron Paramagnetic Resonance (HFEP) study on a  $\text{Mn(IV)}$  monomer.*

S. Singh, A. Prata, B. Barin, B. Ozyilmaz and E. del Barco, MMM/Intermag 2013 – Chicago. *Enhanced Gilbert damping at Permalloy/graphene interfaces.*

A. Amjad, G. M. Espallargas, J. M. Clemente-Juan, R. Klemm, E. del Barco, E. Coronado and M. Evangelisti, Magnetostructural Correlations Workshop 2012 – Tallahassee. *Magnetic exchange studies on the one-dimensional  $\text{Co(II)}$  molecular chains.*

H. M. Qudussi, J. Liu, S. Singh, K. J. Heroux, E. del Barco, S. Hill and D. N. Hendrickson, Magnetostructural Correlations Workshop 2012 – Tallahassee. *Asymmetric Berry-Phase interference patterns in a  $\text{Mn}_4$  single-molecule magnet.*

A. Amjad, G. M. Espallargas, J. M. Clemente-Juan, R. Klemm, E. del Barco, E. Coronado and M. Evangelisti, APS March Meeting 2012 – Boston. *Magnetic exchange studies on the one-dimensional  $\text{Co(II)}$  molecular chains.*

H. M. Qudussi, J. Liu, E. del Barco and S. Hill, APS March Meeting 2012 – Boston. *Exploring the Berry phase interference in a single-molecule magnet with trigonal symmetry.*

S. Ghosh, S. Datta, S. Hill, E. del Barco, S. Cardona-Serra and E. Coronado, APS March Meeting 2012 – Boston. *Mitigation of decoherence in crystals of a  $\text{HoxY}_1\text{xW}_{10}$  ( $x = 0.001$  to  $0.25$ ) single-molecule magnet.*

H. M. Qudussi, J. Liu, S. Singh, K. Heroux, E. del Barco, S. Hill and D. N. Hendrickson, Pakistan Conference 2011 – Pakistan. *The role of internal molecular degrees of freedom in the Quantum Tunneling of the Magnetization of Single-molecule magnets.*

A. Amjad, G. M. Espallargas, J. M. Clemente-Juan, R. Klemm, E. del Barco, E. Coronado and M.

- Evangelisti, APS March Meeting 2011 – Dallas. *Low temperature magnetic dynamics in one-dimensional Co(II) molecular chains.*
- S. Singh, J. Katoch, T. Taguchi, E. del Barco, M. Ishigami and G. Christou, APS March Meeting 2011 – Dallas. *Electronic transport through single-molecule magnets by scanning tunneling spectroscopy.*
- H. M. Quddusi, J. Liu, S. Singh, K. J. Heroux, E. del Barco, S. Hill and D. N. Hendrickson, APS March Meeting 2011 – Dallas. *Asymmetric Berry-Phase interference patterns in a Mn4 single-molecule magnet.*
- L. Chow, R. R. Vanfleet, M. B. Huang, E. del Barco, M. Arcuri and K. Khallaf, International Conference on Extended Defects in Semiconductors (EDS) 2010 – Brighton. *Microstructures and magnetism of Silicon co-implanted with Manganese and Carbon ions*
- F. Haque, M. Langhirt, J. J. Henderson, E. del Barco, T. Taguchi and G. Christou, Magnetism and Magnetic Materials (MMM) 2010 – Atlanta. *Magnetic field dependent electronic transport in Mn4 single-molecule magnet*
- A. Amjad, G. M. Espallargas, J. M. Clemente-Juan, R. Klemm, E. del Barco, E. Coronado and M. Evangelisti, Magnetism and Magnetic Materials (MMM) 2010 – Atlanta. *Magnetic exchange studies on the one-dimensional Co(II) molecular chains*
- E. del Barco, H. M. Qudussi, J. J. Henderson, J. Liu, K. Heroux, P. L. Feng, D. N. Hendrickson and S. Hill, 12<sup>th</sup> International Conference of Molecule-based Magnets 2010 – Beijing, China. *Internal degrees of freedom and quantum tunneling of the magnetization in single-molecule magnets*
- Changhyun Koo, Junjie Liu, Asma Amjad, Patrick L. Feng, Eun Sang Choi, Enrique del Barco, David N. Hendrickson and Stephen Hill, 12<sup>th</sup> International Conference of Molecule-based Magnets 2010 – Beijing, China. *Relieving Frustration: the Case of Antiferromagnetic Triangular Mn3 Complexes*
- F. Haque, M. Langhirt, J. J. Henderson, E. del Barco, T. Taguchi and G. Christou, FIMS Meeting 2010 – Gainesville, FL. *Magnetic field dependent electronic transport in Mn4 single-molecule magnet*
- S. Datta, S. Ghosh, J. Krzystek, S. Hill, E. del Barco, S. Cardona-Serra and E. Coronado, APS March Meeting 2010 – Portland, WA. *Coherent manipulation of mononuclear lanthanide-based single-molecule magnets*
- C. Koo, J. Liu, P. L. Feng, D. N. Hendrickson, J. J. Henderson, E. del Barco and S. Hill, APS March Meeting 2010 – Portland, WA. *Relieving frustration: The case of antiferromagnetic triangular Mn3 complexes*
- J. Liu, E. del Barco and S. Hill, APS March Meeting 2010 – Portland, WA. *Comparison of Magnetization Tunneling in the Giant-Spin and Multi-Spin Descriptions of Single-Molecule Magnets*
- F. Haque, M. Langhirt, J. J. Henderson, E. del Barco, T. Taguchi and G. Christou, APS March Meeting 2010 – Portland, WA. *Magnetic field dependent electronic transport in Mn4 single-molecule magnet*
- S. Datta, S. Ghosh, J. Krzystek, S. Hill, E. del Barco, S. Cardona-Serra and E. Coronado, APS March Meeting 2010 – Portland, WA. *Coherent manipulation of mononuclear lanthanide-based single-molecule magnets*
- J. J. Henderson, E. del Barco, C. Koo, S. Hill, P. Feng, D. N. Hendrickson and M. Nakano, APS March Meeting 2009 – Pittsburgh, PA. *Magnetization studies of a new single-molecule magnet Mn3*
- J. J. Henderson, C. M. Ramsey, E. del Barco, S. Datta, S. Hill, T. Stamatatos and G. Christou, FIMS Meeting 2008 – Gainesville, FL. *Control of Inhomogeneity in Magnetically Dilute Crystals of Antiferromagnetic Molecular Wheels*

J. J. Henderson, C. M. Ramsey, E. del Barco, S. Datta, S. Hill, T. Stamatatos and G. Christou, FIMS Meeting 2008 – Gainesville, FL. *Control of Inhomogeneity in Magnetically Dilute Crystals of Antiferromagnetic Molecular Wheels*

S. Hill, S. J. Shah, E. del Barco and D. N. Hendrickson, ICMM Conference 2008 – Florence (Italy). *High-frequency EPR studies of  $[Mn_{12}(Aced)_8(CH_3COO)_{14}] \cdot 7CH_3CN$*

J. J. Henderson, C. M. Ramsey, E. del Barco, T. Stamatatos and G. Christou, APS March Meeting 2008 – New Orleans. *EPR Studies of Magnetically Dilute Ga-Doped Single Crystals of  $Fe_{18}$  Antiferromagnetic Molecular Wheels*

C. M. Ramsey, E. del Barco, S. Hill, S. Shah, C. Beedle and D. N. Hendrikson, APS March Meeting 2008 – New Orleans. *Quantum Interference in the Longitudinal Oscillations of the Total Spin of a Dimeric Molecular Nanomagnet*

Juan-Carlos Gonzalez-Ponz, John Henderson, Enrique Del Barco and Barbaros Ozyilmaz, APS March Meeting 2008 – New Orleans. *Magnetic behavior of PdNi nanowires and extended thinfilms as a function of the film thickness*

G. de Loubens, G. D. Chaves-O'Flynn, A. D. Kent, C. M. Ramsey, E. del Barco, C. Beedle and D. N. Hendrikson, MMM Conference 2007 – Tampa. *Magnetization dynamics in the single molecule magnet  $Ni_4$  under pulsed microwave irradiation*

C. M. Ramsey, E. del Barco, T. Stamatatos and G. Christou, MMM Conference 2007 – Tampa. *EPR studies of dilute Ga doped single crystals of  $Fe_{18}$  antiferromagnetic molecular rings*

J. J. Henderson, J. C. Gonzalez-Pons, E. del Barco, B. Ozyilmaz, MMM Conference 2007 – Tampa. *Magnetic behavior of PdNi nanowires and extended thin films as a function of the film thickness*

L. Chow, J. C. Gonzalez-Pons, E. del Barco, R. Vanfleet, A. Misiuk, A. Barcz, M. Prujarczyk, A. Shunmugavela and G. Chai. International Conference 2007 – Berlin, Germany. *Diffusion profiles and magnetic properties of Mn-implanted silicon after thermal annealing*

L. Chow, J. C. Gonzalez-Pons, E. del Barco, R. Vanfleet, A. Misiuk, A. Barcz, E. S. Choi and G. Chai. ICMM 2007 – Kolkata, India, *Structures and magnetization of defect-associated sites in silicon*

G. de Loubens, G. D. Chaves-O'Flynn, A. D. Kent, C. M. Ramsey, E. del Barco, C. Beedle and D. N. Hendrikson, APS March Meeting 2007 – Denver. *Energy relaxation between low lying split spin-states of the single molecule magnet  $Ni_4$*

C. M. Ramsey, J. J. Henderson, E. del Barco, A. Mishra and G. Christou, APS March Meeting 2007 – Denver. *Fabrication of nano-gapped single-electron transistors for the study of single-molecule magnets at low temperature*

J. J. Henderson, C. M. Ramsey, E. del Barco, A. Mishra and G. Christou, FIMS Meeting 2007 – UF, Gainesville. *Fabrication of nano-gapped single-electron transistors for the study of single-molecule magnets at low temperature*

J. J. Henderson, C. M. Ramsey, E. del Barco, A. Mishra and G. Christou, Graduate Research Forum 2007 – Orlando. *Fabrication of nano-gapped single-electron transistors for the study of single-molecule magnets at low temperature*

J. J. Henderson, C. M. Ramsey, E. del Barco, A. Mishra and G. Christou, SPS Meeting 2007 – Orlando. *Fabrication of nano-gapped single-electron transistors for the study of single-molecule magnets at low temperature*

G. de Loubens, A. D. Kent, C. M. Ramsey, E. del Barco, C. Beedle and D. N. Hendrikson, MMM/Intermag Conference 2007 – Baltimore. *Pulse EPR studies of the magnetization dynamics of single molecule magnet  $Ni_4$*



J. J. Henderson, C. M. Ramsey, E. del Barco, A. Mishra and G. Christou, MMM/Intermag Conference 2007 – Baltimore. *Fabrication of nano-gapped single-electron transistors for the study of single-molecule magnets at low temperature*

APS MARCH MEETING 2006 – Baltimore. *Single-molecule magnet based single-electron transistors*

LT05 – Orlando, FL. *Microwave and Magnetic Studies of High-Spin Superposition States in Ni4*

ICMM 2004 – Japan. *Photon induced transitions between superposition states in SMMs.*

MMM 2004 – Jacksonville FL. *Photon induced transitions between superposition states in SMMs.*

APS March Meeting 2003 – Austin TX. *Symmetry of Quantum tunneling in Mn12-acetate SMM*

MRS Fall Meeting 2002 – Boston MA. *Quantum splittings distribution in Mn12-acetate SMM*

#### **OTHER SYNERGISTIC ACTIVITIES:**

Author of multiple articles in popular scientific media in Spain addressed to the general public for the popularization of recent research advances in nanoscience.

Author of the science-fiction novel PUNTO OMEGA (Publisher: *Equipo-Sirius, Madrid, Spain, 2004*). Rigorously treated science-based novels are excellent tools to bring science knowledge to the general public.

#### **COLLABORATORS & OTHER AFFILIATIONS:**

1. *Collaborators:* G. Christou (UF, Gainesville, USA), D. A. Hendrikson (UCSD, San Diego, USA), E. Coronado (UV, Valencia, Spain), F. Hernandez (UCF), J. Long (UCB, Berkeley, USA), S. Hill (UF, Gainesville, USA), A. D. Kent (NYU, New York, USA), P. Stamp (UBC, Vancouver), Igor Tupitsyn (UBC, Vancouver), F. Luis and A. Camon (UZ, Zaragoza, Spain), N. Agrait (UAM, Madrid, Spain), O. Waldmann (UF, Freiburg, Germany), J. Tejada (UB, Barcelona, Spain), X.X.Zhang (KAUST, Saudi Arabia), B. Ozeylmaz (US, Singapur), C. Achim (CMU, Pittsburg, USA)
2. *Graduate and Postdoctoral Advisors:* Thesis advisor: J. Tejada (University of Barcelona, Spain). Postdoctoral sponsor: A. D. Kent (New York University, USA).

#### **FUNDING:**

##### **External Funding Secured:**

TITLE: “Single-Molecule Magnets: Internal Degrees of Freedom and Quantum Dynamics”

PI: E. del Barco (100%)

SPONSORING AGENCY: NSF-DMR

DATE BEGUN: 09/01/2015 COMPLETION DATE: 08/31/2018

TOTAL AMOUNT: **\$410,893**

TITLE: “Travel Supplement for ECCS Award”

PI: E. del Barco (100%)

SPONSORING AGENCY: NSF-OIST/ECCS

DATE BEGUN: 05/01/2015 COMPLETION DATE: 4/31/2016

TOTAL AMOUNT: **\$19,710**

TITLE: “REU Supplement for ECCS Award”

PI: E. del Barco (100%)  
SPONSORING AGENCY: NSF-OIST/ECCS  
DATE BEGUN: 01/01/2015 COMPLETION DATE: 12/31/2015  
TOTAL AMOUNT: **\$8,000**

TITLE: “Spin Injection in Graphene-based devices”  
PI: E. del Barco (70%) co-PI: Eduardo Mucciolo (30%)  
SPONSORING AGENCY: NSF- ENG ECCS  
DATE BEGUN: 06/01/2014 COMPLETION DATE: 5/31/2017  
TOTAL AMOUNT: **\$360,000**

TITLE: “Supplement for CAREER Award”  
PI: E. del Barco (100%)  
SPONSORING AGENCY: NSF-OIST/ECCS  
DATE BEGUN: 02/01/2013 COMPLETION DATE: 1/31/2014  
TOTAL AMOUNT: **\$27,500**

TITLE: “Dynamical Spin Pumping in Graphene-based Spintronics Devices”  
PI: E. del Barco (100%)  
SPONSORING AGENCY: NSF-OIST/ECCS  
DATE BEGUN: 05/01/2013 COMPLETION DATE: 4/30/2014  
TOTAL AMOUNT: **\$78,000**

TITLE: “EAGER – PACMAN: Photo-activated current and magnetization in Au nanorings”  
PI: F. Hernandez (40%) Chem.-UCF. coPIs: E. del Barco (40%) and J.Zuo (20%)  
SPONSORING AGENCY: NSF-ENG-ECCS  
DATE BEGUN: 08/01/2012 COMPLETION DATE: 7/31/2013  
TOTAL AMOUNT: **\$80,000**

TITLE: “NSF REU supplement for CAREER award”  
PI: Enrique del Barco  
SPONSORING AGENCY: NSF-DMR  
DATE BEGUN: 01/01/2011 COMPLETION DATE: 12/31/2012  
TOTAL AMOUNT: **\$7,500**

TITLE: “Collaborative Research: Molecular Spintronics with Single-Molecule Magnets”  
PI: Enrique del Barco (70%) co-PI: Eduardo Mucciolo (30%)  
SPONSORING AGENCY: NSF ENG ECCS  
DATE BEGUN: 05/01/2010 COMPLETION DATE: 4/31/2013  
TOTAL AMOUNT: **\$400,000**

TITLE: “NSF REU supplement for CAREER award”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 07/01/2010 COMPLETION DATE: 6/30/2011  
TOTAL AMOUNT: **\$7,000**

TITLE: “Supplement to NSF CAREER: Quantum spin dynamics in single-molecule magnets”  
PI: Enrique del Barco  
SPONSORING AGENCY: NSF-DMR  
DATE BEGUN: 02/01/2008 COMPLETION DATE: 01/31/2013  
TOTAL AMOUNT: **\$15,000**

TITLE: “Millimeter-wave sensing of acetone and other vapors”

PI: Robert Peale (50%) Co-PIs: Enrique del Barco (25%), Glenn Boreman (25%)  
SPONSORING AGENCY: Lockheed Martin.  
DATE BEGUN: 06/01/2007 COMPLETION DATE: 12/01/2007  
TOTAL AMOUNT: **\$20,000**

TITLE: “Millimeter-wave sensing of acetone and other vapors, I-4 funding”  
PI: Robert Peale (50%) Co-PIs: Enrique del Barco (25%), Glenn Boreman (25%)  
SPONSORING AGENCY: Lockheed Martin.  
DATE BEGUN: 09/04/2007 COMPLETION DATE: 06/30/2008  
TOTAL AMOUNT: **\$10,000**

TITLE: “Real Time Physics labs for UCF”  
PI: Costas Eithimiou (50%) Co-PI: Enrique del Barco (50%)  
SPONSORING AGENCY: NSF  
DATE BEGUN: 07/01/2007 COMPLETION DATE: 06/31/2009  
TOTAL AMOUNT: **\$150,000**

TITLE: “NSF CAREER: Quantum spin dynamics in single-molecule magnets”  
PI: Enrique del Barco  
SPONSORING AGENCY: NSF-DMR  
DATE BEGUN: 02/01/2008 COMPLETION DATE: 01/31/2013  
TOTAL AMOUNT: **\$480,000**

TITLE: “NSF SGER: Development of single-electron transistors based on individual SMMs”  
PI: Enrique del Barco  
SPONSORING AGENCY: NSF-DMR  
DATE BEGUN: 09/01/2007 COMPLETION DATE: 08/31/2009  
TOTAL AMOUNT: **\$179,007**

TITLE: “Agilent Collaborative Grant”  
PI: Enrique del Barco  
SPONSORING AGENCY: Agilent Technologies  
DATE BEGUN: 01/07/2006 COMPLETION DATE: 01/07/2007  
TOTAL AMOUNT: **\$70,000**

**Internal Funding Secured:**

TITLE: “i-STEM Fellowship”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 08/15/2015 COMPLETION DATE: 8/14/2015  
TOTAL AMOUNT: **\$20,000**

TITLE: “UCF Undergraduate Initiative, Tyler Townsend”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 02/1/2015 COMPLETION DATE: 6/30/2015  
TOTAL AMOUNT: **\$3,000**

TITLE: “2014 UCF Researching for the Stars Award”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 7/1/2014 COMPLETION DATE: 6/30/2017  
TOTAL AMOUNT: **\$30,000**

TITLE: “UCF Undergraduate Initiative”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 08/10/2011 COMPLETION DATE: 5/15/2012  
TOTAL AMOUNT: **\$3,000**

TITLE: “UCF Undergraduate Initiative, Matthew Arcuri”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 08/10/2011 COMPLETION DATE: 5/15/2012  
TOTAL AMOUNT: **\$3,000**

TITLE: “UCF Undergraduate Initiative”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 08/10/2010 COMPLETION DATE: 5/15/2011  
TOTAL AMOUNT: **\$3,000**

TITLE: “UCF Undergraduate Initiative, Matthew Arcuri”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 08/10/2010 COMPLETION DATE: 5/15/2011  
TOTAL AMOUNT: **\$3,000**

TITLE: “UCF Undergraduate Initiative”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 05/15/2009 COMPLETION DATE: 12/15/2009  
TOTAL AMOUNT: **\$3,000**

TITLE: “UCF In-house Research Grant”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 01/01/2008 COMPLETION DATE: 01/01/2009  
TOTAL AMOUNT: **\$7,500**

TITLE: “MFFA: Quantum spin dynamics in single-molecule magnets”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 02/01/2008 COMPLETION DATE: 01/31/2013  
TOTAL AMOUNT: **\$45,378**

TITLE: “MFFA: Development of single-electron transistors based on individual SMMs”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 09/01/2007 COMPLETION DATE: 08/31/2009  
TOTAL AMOUNT: **\$12,623**

TITLE: Undergraduate Research initiative: Juan Carlos Gonzalez, Summer 2005  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF-OOR  
DATE BEGUN: 05/15/2006 COMPLETION DATE: 08/07/2006  
TOTAL AMOUNT: **\$1,500**

TITLE: I2Lab fellowship for John Henderson, 2006-2007  
PI: Enrique del Barco

SPONSORING AGENCY: I2Lab  
DATE BEGUN: 08/01/2006 COMPLETION DATE: 08/01/2007  
TOTAL AMOUNT: **\$25,000**

TITLE: “UCF In-house Research Grant”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF  
DATE BEGUN: 05/15/2007 COMPLETION DATE: 08/01/2007  
TOTAL AMOUNT: **\$7,500**

TITLE: “Acquisition of Major Research Equipment: High Microwave Frequency and High Magnetic Field System for Wide-Range Characterization of Magnetic Nanostructures at Ultra-Low Temperatures”  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF- Presidential Initiative to Fund Major Research Equipment  
DATE BEGUN: 01/10/2005  
TOTAL AMOUNT: **\$184,052**

TITLE: Undergraduate Research initiative: Daniel Roig-Canellas, Summer 2005  
PI: Enrique del Barco  
SPONSORING AGENCY: UCF-OOR  
DATE BEGUN: 06/22/2005 COMPLETION DATE: 08/01/2005  
TOTAL AMOUNT: **\$1,500**

**Donations:**

TITLE: “Nanofabrication Equipment for the Physical Science Clean Room”  
PI: M. Ishigami (33%) co-PIs: E. del Barco (33%) and R. Peale (33%)  
SPONSORING AGENCY: AFRL  
DATE BEGUN: 01/01/2012 COMPLETION DATE: 12/31/2012  
TOTAL AMOUNT: **\$1,000,000 (estimated value of the equipment donated)**