Dr. Daniel López

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Dr. Daniel López is the Group Leader of the Nanofabrication and Devices group at the Center for Nanoscale Materials at Argonne National Laboratory. The Nanofabrication and Devices Group is advancing the state-of-the-art in nanofabrication and the fundamental science of nanoscale systems. The group research program involves a multidisciplinary approach combining experiments, theory and simulation to understand the fundamental processes governing the fabrication and integration of nanoscale materials and devices, and by this means, to work toward the design and control of functional nanoscale systems. The group is creating new processes capable of achieving sub-10 nm critical dimensions with large area patterning. Micro- and nano-electromechanical systems are being developed as platforms for manipulation and control of nanostructures. Carbon-based nanomaterials are being investigated due to their enhanced electrical, mechanical, thermal and optical performance in nanoscale devices. Our research is synergistic with the scientific demands of our user community, requiring expertise in nanofabrication and nanodevices and access to state-of-the-art nanofabrication capabilities. A large part of the group's effort is oriented toward development of novel instrumentation and materials that the user community can exploit to advance their own research programs.

Dr. López received his Ph.D. in Physics from the Instituto Balseiro in Argentina in 1996. From 1996 to 1998 he worked as a Postdoctoral Fellow at IBM T. J. Watson Research Center (Yorktown Heights, NY) and at Argonne National Laboratory (Materials Science Division) doing research in the field of vortex physics in superconductors. In 1998 he joined Bell Laboratories, Lucent Technologies (Murray Hill, NJ) as a full-time Research Staff where he worked until the summer of 2008. Since August 2008, he has been working at the Center for Nanoscale Materials at Argonne National Laboratory.
His research interests center on understanding long-range interactions in nanoscale systems, light-matter interaction at the nanoscale, and fluctuating non-linear nanoelectromechanical systems. He has authored more than 110 technical publications, holds over 25 granted and pending patents and has given over 100 invited talks all over the world.

Specific R&D Interest

- Nano and Micro Electro Mechanical Systems (NEMS/MEMS):
  - Integration of NEMS devices with plasmonic nanostructures and novel materials
  - Manipulation of near field interactions in nanoscale systems
  - Non-linear dynamics of nanoscale devices and synchronization
  - Spatial Light Modulators (SLM) for x-ray manipulation, nano-manufacturing and optical communications
- Ultra-sensitive nano-mechanical sensors: study of Casimir and quantum forces in mechanical structures and corrections to Newtonian gravitation at short length scales
- Commercialization of micro and nano technology

- Integration of NEMS/MEMS devices with standard CMOS technology
- Vortex physics in superconductors

Selected publications

- **Strong Casimir force reduction through metallic surface nanostructuring**; F. Intravaia, S. Koev, I. Jung, A. Talin, P. Davids, R. Decca, V. Aksyuk, D. Dalvit and **D. López**; Nature Communications 4, 2515 (2013)
- **Frequency stabilization in nonlinear micromechanical oscillators**; D. Antonio, D. Zanette and **D. López**; Nature Communications 3, 806 (2012)
- **Temporal modulation of x-rays using MEMS micromirrors**; D. Mukhopadhyay, D. Walko, I. W. Jung, J. Wang, G. Shenoy and **D. López**; Solid-State Sensors, Actuators and Microsystems (Transducers 2011), 1562 (2011)
- **Casimir Force in Micro and Nano Electro Mechanical Systems**; R. Decca, V. Aksyuk and **D. López**; Casimir Physics - Lecture Notes in Physics, Volume 834, 287 (2011)
- **Application of the proximity force approximation to gravitational and Yukawa-type forces;** R.S. Decca, E. Fischbach, G.L. Klimchitskaya, D. E. Krause, **D. López** and V. M. Mostepanenko; Phys. Rev. D **79**, 124021 (2009).
- **Tests of new physics from precise measurements of the Casimir pressure between two gold-coated plates**; R. S. Decca, **D. López**, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, and V. M. Mostepanenko, Phys. Rev. D **75**, 077101 (2007)
- **Two-dimensional MEMS array for maskless lithography and wavefront modulation; D. López**, V. Aksyuk, G. Watson et al., Proc. SPIE vol. 6589 - Smart Sensors, Actuators, and MEMS III (2007)
- **Constraining new forces in the Casimir regime using the isoelectronic technique**; R.S. Decca, **D. López**, H. B. Chan, E. Fischbach, D. E. Krause, and C. R. Jamell; Phys. Rev. Lett. **94,** 240401 (2005)
- **MEMS–based force sensors: design and applications**; **D. López**, R. Decca, E. Fischbach and D. Krause; Bell Labs Technical Journal, Special issue on Nanotechnology, vol. 10 (3), 61-80 (2005)
- **Measurement of the Casimir Force between Dissimilar Metals***;* R. S. Decca, **D. López**, E. Fischbach, and D. E. Krause; Phys. Rev. Lett. **91**, 050402 (2003)
- **Direct Observation of Spontaneous Weak-Ferromagnetism in the Superconductor $ErNi_2B_2C$***;* S. M. Choi, J. W. Lynn, **D. López**, P. L. Gammel, P. C. Canfield and S. L. Bud'ko; Phys. Rev. Lett. **87**, 107001 (2001)
- **Spatially resolved dynamic correlation in the vortex state of high temperature superconductors***;* **D. López**, W. K. Kwok, H. Safar, R. J. Olsson, A. M. Petrean, L. M. Paulius, and George W. Crabtree; Phys. Rev. Lett. 82, 1277 (1999)
- **Superconductivity enhanced by Hg fission***;* L. Krusin-Elbaum, **D. López**, J. R. Thompson, R. Wheeler, J. Ullmann, C. W. Chu and Q. M. Lin, Nature 389, 243 (1997)
- **Coincidence of vortex-lattice melting and loss of vortex correlation along the c direction in untwinned $YBa_2Cu_3O_{7-d}$ single crystals; D. López**, E. F. Righi, G. Nieva and F. de la Cruz, Phys. Rev. Lett. **7**6, 4034 (1996)