

CHRIS H. GREENE

CONTACT INFORMATION

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PROFESSIONAL APPOINTMENTS

August 2012–present **Purdue University**

Professor of Physics

2011-2012 **University of Colorado at Boulder**

Arts & Sciences College Professor of Distinction

1989–2012 **University of Colorado at Boulder**

Professor of Physics, Fellow of JILA

1981–1988 **Louisiana State University**

Assistant Professor, then Associate Professor, then Professor of Physics

EDUCATION

1980-1981 **Stanford University Postdoctoral Research Associate**

- Postdoctoral advisor: Richard Zare

1976-1980 **University of Chicago**

- M.Sc. and Ph.D., Physics; Graduate Research Advisor: Ugo Fano
- Recipient of an IBM Graduate Fellowship

1972–1976 **University of Nebraska-Lincoln**

- B.S., Physics and Mathematics
- Graduated *with high distinction*.
- National Merit Scholarship

HONORS AND AWARDS

Selected as a College Professor of Distinction, 2011, by the University of Colorado at Boulder College of Arts and Sciences

Davisson-Germer Prize of the American Physical Society, awarded 2010

University of California at Berkeley, Visiting Miller Professorship for 2007

Alexander von Humboldt Research Award for Senior U.S. Scientists, 2007

Elected and served as Chair of JILA during 2005 and 2006

The first I. I. Rabi Prize of the American Physical Society, awarded 1991

Fellow of the American Physical Society, since 1990

Presidential Young Investigator Award, 1985

Alfred P. Sloan Foundation Fellowship, 1984

PROFESSIONAL EXPERIENCE

Co-organizer, 2010 KITP Workshop titled: Frontiers of science with intense, ultrafast, and coherent x-ray sources

Chair, Division of Atomic, Molecular, and Optical Physics (DAMOP) of the American Physical Society (APS), June 2002 - May 2003

Various Program and Executive Committees for organizations, including DAMOP, the Few-Body Topical Group of the APS, and the ICPEAC

Director, Center for Theoretical Atomic, Molecular, and Optical Physics at JILA and the University of Colorado, 1991-1999

Chaired the Atomic Physics Gordon Conference, 1994; Vice-Chair in 1992

SELECTED RESEARCH HIGHLIGHTS

2006-2011 Developed a nonperturbative theory of 4-body interactions in an ultracold gas that includes 4-body recombination and other inelastic processes, and connects these phenomena with the universality regime and Efimov physics. (with J. P. D’Incao, J. von Stecher, S. T. Rittenhouse, and N. P. Mehta) Some of the predictions from this theoretical project were subsequently confirmed in 2009 by R. Grimm *et al.* in Innsbruck, and by Randy Hulet *et al.* at Rice University, as well as by a number of other experiments worldwide.

2001-2004, Solved the longstanding problem of the theoretical description of H_3^+ dissociative recombination, identifying both the qualitative Jahn-Teller mechanism in a 2001 Nature Letter, and then developing the first quantitative treatment of this process. (with V. Kokoouline and B. Esry)

2000, Predicted the existence of two novel classes of molecular Rydberg states, with oscillatory Born-Oppenheimer potential curves, work that was featured subsequently in Nature, Scientific American, Science News, and the London Daily Telegraph. (with H. Sadeghpour and A. Dickinson) Some of these predictions have subsequently been verified in experiments carried out in the Stuttgart group of T. Pfau.

1999-2003, Predicted that 3-body recombination of three ultracold bosonic atoms should exhibit a connection to Efimov states, including quantum interference and resonance effects when the 2-body scattering length is large. (with B. Esry and J. P. Burke) Those predictions were subsequently verified experimentally by R. Grimm’s group in Innsbruck, and published in Nature in March of 2006.

1997-2002, Developed a simple description of ultracold two-body collisions, based on multichannel quantum defect theory, which permitted an efficient and accurate determination of scattering lengths for a number of systems; in the case of ultracold potassium-potassium collisions, these gave the first accurate characterization of the atom-atom interactions including the resonances. (mainly

with J. L. Bohn and J. P. Burke, Jr.).

1997, Gave the first quantitative description of two-component Bose-Einstein condensates of a dilute alkali-metal atom gas, with full 3D calculations of the ground state geometry. (with B. Esry, J. P. Burke, and J. Bohn)

1994, Predicted that the $H^{(2)}$ ion has no resonance states, in conflict with existing theoretical and experimental evidence at that time; our prediction was subsequently verified experimentally by two independent groups. (with F. Robicheaux and R. Wood)

1985-1991, Developed a combination of R-matrix and multichannel quantum defect theory that produced the first quantitative capability of theory to predict the photoionization spectra of the heavy alkaline-earth atoms and alkali negative ions on the basis of nearly *ab initio* calculations. (with P. O'Mahony, L. Kim, M. Aymar, R. Wood, and others)

1982-1983, Formulated a widely-cited theoretical description of photofragment alignment and orientation, and a treatment of alignment and orientation effects in laser-induced fluorescence. (with R. N. Zare)

2012, Citation h-index = 48, with over 8700 total citations

PUBLICATION RECORD AND AREAS OF EXPERTISE

Research Subfields: Theoretical *Atomic, Molecular, and Optical Physics, Chemical Physics*

Publications in refereed journals: 256, as of March, 2012; see <http://www.researcherid.com/rid/C-3821-2011>

Publication list: see below.

Annual level of funding from federal research grants, as of March 2012, approximately \$520K per year for my group's research. Agencies: DOE, NSF, NSF-PFC, AFOSR-MURI

Co-principal investigator on the NSF-supported Physics Frontier Center at JILA since 2011, which was renewed in 2011 for more than \$16M over the next five years.

STUDENT SUPERVISION AND THEIR ACCOMPLISHMENTS

I have been the primary advisor for 19 graduated PhD students, and I have additionally co-sponsored the PhD theses of two graduate students, and the Masters thesis of one student.

Three of those PhD students have been finalists for the annual DAMOP Thesis Award, and two of them (Brett Esry in 1997 and Javier von Stecher in 2009) were co-recipients of that award.

Five of my former PhD students and postdocs were offered prestigious postdoctoral appointments at ITAMP, at the Harvard-Smithsonian Center for Astrophysics, and three were offered NRC postdoctoral positions at NIST-Gaithersburg.

I have been the postdoctoral advisor for 21 research associates to date.

My research group as of March 2012 includes 4 PhD students and 3 postdoctoral research

associate.

I have been the primary advisor for 13 undergraduates who have performed research in my group, 7 of whom completed honors theses based on their projects.

PUBLICATION LIST (5 SIGNIFICANT PAPERS)

229. **"Signatures of universal four-body phenomena and their relation to the Efimov effect"**, J. von Stecher, J. P. D'Incao, and C. H. Greene, *Nature Physics* 5, 417-421 (2009).
169. **"Unified theoretical treatment of dissociative recombination of D_{3h} triatomic ions: Application to H_3^+ and D_3^+ "**, V. Kokouline and C. H. Greene, *Phys. Rev. A* 68, 012703 -1 to -23 (2003).
142. **"Creation of polar and nonpolar ultra-long-range Rydberg molecules"**, C. H. Greene, A. S. Dickinson, and H. R. Sadeghpour, *Phys. Rev. Lett.* 85, 2458-2461 (2000).
135. **"Recombination of Three Atoms in the Ultracold Limit,"** B. D. Esry, C. H. Greene and J. P. Burke, Jr., *Phys. Rev. Lett.*, 83, 1751-1754 (1999).
58. **"Dominant Photodetachment Channels in H^{\square} "**, H. R. Sadeghpour and C. H. Greene, *Phys. Rev. Lett.* 65, 313-316 (1990).