

Clifford M. Surko

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Education

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|-------------|-------------------------------------------------------------------|
| 1959 -1964 | A.B., Physics and Mathematics, University of California, Berkeley |
| 1964 - 1968 | Ph.D, Physics, University of California, Berkeley |

Employment and Research Appointments

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| 1968 - 1969 | Assistant Research Physicist, UC Berkeley |
| 1969 - 1982 | Member of the Tech. Staff, AT&T Bell Laboratories, Murray Hill, NJ |
| 1977 - 1984 | Visiting Research Scientist, Plasma Fusion Center,
Massachusetts Institute of Technology |
| 1979 | Visiting Senior Research Scientist, Ecole Polytechnique, Paris |
| 1982 - 1988 | Head, Semiconductor and Chemical Physics Research Department,
AT&T Bell Laboratories, Murray Hill, NJ |
| 1988 - 2004 | Professor of Physics, University of California, San Diego |
| 2004 -> | Distinguished Professor of Physics, University of California,
San Diego |

Honors and Awards

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| 1964 | A.B. degree with great distinction in physics |
| 1964 | Outstanding physics major, UC Berkeley |
| 1985 | Fellow, American Physical Society |
| 1999 | Fellow, American Association for the Advancement of Science |
| 2004 | Distinguished Professor of Physics (new U. C. title, 2004) |
| 2015 | American Physical Society James Clerk Maxwell Prize for
Plasma Physics |

Research Interests

Professor Surko and his collaborators develop techniques to accumulate, store and manipulate large numbers of positrons and to create specially tailored plasmas and positron beams - in essence, to make low-energy antimatter in the laboratory a reality. They use these tools in a number of applications. They conducted the first studies of electron-positron plasmas (a beam-plasma experiment), and they conducted a number of high-resolution studies of the interaction of positrons with atoms and molecules. Current work focuses on understanding positron binding to neutral matter and molecular dynamics in the presence of attached positrons (lifetimes ≤ 10 ns). These processes are important elements in developing a quantitative chemistry of matter and antimatter.

They are developing new types of specially tailored positron beams, including the use of cryogenically cooled, trapped positrons to improve energy resolution. They are also taking steps to build a novel multicell trap to extend present antimatter storage capabilities by orders of magnitude.

Finally, exploiting strongly magnetized electron plasmas as an analog, they are studying the two-dimensional dynamics of fluid vorticity under the influence of strong, externally applied shear and strain flows.

Selected Service to the Scientific Community

APS James Clerk Maxwell Prize Selection Committee (member, 2015; chair 2016)
Organizer, Int. Workshop on Positrons in Astrophysics, Murren, Switzerland (2012)
Vice Chair, Dawson Prize Committee, APS Division of Plasma Physics (2009, 2010)
Organizing Committee, Int. Workshops on Positron and Ps Physics (1995 – 2013)
Exec. Comm., Int. Conf. on Photon, Electron and Atomic Collisions (2003 – 2007)
Nominating Committee, APS Division of Plasma Physics (2006 - 07; chair 2007)
National Research Council Plasma 2010 Committee (2005 – 2007)
National Research Council Burning Plasma Assessment Committee (2002 – 2004)
Executive Committee, APS Division of Plasma Physics (2001 – 2003)
American Physical Society Nominating Committee (1999 – 2001)
Co-chair, National Research Council Panel on Opportunities in Plasma Science and Technology (1993 - 1995)

Selected and Recent Publications (Professor Surko has approximately 170 refereed publications.)

- "A Cryogenically Cooled, Ultra-High-Energy-Resolution, Trap-Based Positron Beam," M. R. Natisin, J. R. Danielson, and C. M. Surko, *Appl. Phys. Lett.* **108**, 024102 (2016)
- "Plasma and Trap-based Techniques for Science with Positrons," J. R. Danielson, D. H. E. Dubin, R.G. Greaves, and C. M. Surko, *Rev. Mod. Phys.* **87**, 247 (2015).
- "Role of Vibrational Dynamics in Resonant Positron Annihilation on Molecules," A. C. L. Jones, J. R. Danielson, M. R. Natisin, and C. M. Surko, *Phys. Rev. Lett.* **110**, 223201 (2013).
- "Positron-molecule Interactions: Resonant Attachment, Annihilation, and Bound States," G. F. Gribakin, J. A. Young, and C. M. Surko, *Rev. Mod. Phys.* **82**, 2557-2607 (2010).
- "Creation of Finely Focused Particle Beams from Single-component Plasmas," T. R. Weber, J. R. Danielson and C. M. Surko, *Phys. Plasmas* **15**, 012106 (2008).
- "Plasma Manipulation Techniques for Positron Storage in a Multicell Trap," J. R. Danielson, T. R. Weber and C. M. Surko, *Phys. Plasmas* **13**, 123502, 1 (2006).
- "Low-Energy Positron Interactions with Atoms and Molecules," C. M. Surko, G. F. Gribakin, and S. J. Buckman, *J. Phys. B* **38**, R57 (2005).
- "An Electron-Positron Beam-Plasma Experiment," R. G. Greaves and C. M. Surko, *Phys. Rev. Lett.* **75**, 3846 (1995).