

Biographical Sketch: Klaus Honscheid

Contact Information

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Education

1984 Diploma in physics (University of Bonn, Germany)
1988 Ph.D. in physics (University of Bonn, Germany)

Positions and Employment

1988 – 1989 Research Associate, University of Bonn
1990 – 1992 Research Associate, Cornell University
1993 – 1996 Assistant Professor, Ohio State University
1996 – 2000 Associate Professor, Ohio State University
2000 – Pres. Professor (Physics), Ohio State University

Honors

1989 College of Arts and Sciences Ph.D. Award (University of Bonn)
1990 – 1992 Alexander von Humboldt Foundation Lynen Fellow
1995 – 1997 Alfred P. Sloan Research Fellow
2004 University Distinguished Teaching Award, The Ohio State University
2005 Fellow, American Physical Society

Other Experience and Professional Service

1996 – 2000 Project Leader, CLEO III Data Acquisition
1999 – 2000 Co-Spokesman, CLEO Collaboration
1996 – 2002 Member Particle Data Group
1997 Scientific Advisory Committee, Heavy Flavor Physics, Honolulu, Hawaii
2000 Organizing Committee, DPF 2000, Columbus, Ohio
2002 Member of DOE CD2/3 Review of Run IIb at Fermilab
2003 – 2007 President, Ohio Chapter of the AvHAA
2004 – 2005 Member of DOE Review of Lawrence Berkeley National Laboratory
2006 Member of DOE CD1 Review of the Nova Experiment at Fermilab
2006 Organizing Committee, PASCOS 2006, Columbus, Ohio
2006 – Pres. Member, CCAPP Science Board
2007 – Pres. Member, DES Management Committee
2007 Member of DOE Review of Argonne National Lab
2007 Member of DOE/NSF Review of QuarkNet
2007 Scientific Advisory Committee, Real Time 07, Chicago, Illinois
2007 Member of DOE Review of MIT Laboratory for Nuclear Science
2008 – Pres. Member, IEEE CANPS technical committee
2009 Scientific Advisory Committee, Real Time 09, Beijing, China
2009 Chair, DES Publications Board
2010 Scientific Advisory Committee, Real Time 10, Lisbon, Portugal

Collaborators

1990 – 2003	Member, CLEO Collaboration
1996 – 2002	Member Particle Data Group
2002 – Pres.	Member, BaBar Collaboration
2002 – Pres.	Member, CIMA Collaboration (Medical Imaging)
2005 – Pres.	Member, LSST Collaboration
2007 – Pres.	Member, DES Collaboration
2008 – Pres.	Member, BOSS Collaboration

Graduate and Postdoctoral Advisor

Graduate Advisor	R. Wedemeyer, University of Bonn, Germany
Postdoctoral Advisor	D. Cassel, Cornell University

Graduate and Postdoctoral Advisees

Jana Thayer	PhD Student	now at SLAC
Chul Gwon	PhD Student	now at University of Maryland
Dirk Hufnagel	PhD Student	now a CERN Fellow
Joe Regensburger	PhD Student	now at Battelle
Luke Corwin	PhD Student	now at University of Indiana
James Morris	PhD Student	now at Stony Brook Medical School
Don Burdette	PhD Student	
Jeff Steinberg	PhD Student	now at Duke University
Julia Young	current PhD Student	
Eric Cochran	current PhD Student	
Th. Allmendinger	Postdoc	now at Siemens, Germany
Paul Jackson	Postdoc	now at SLAC
Gabriele Benelli	Postdoc	now a CERN Fellow
Amir Rahimi	Postdoc	now at Battelle
Steve Sekula	Postdoc	now assistant professor at SMU
Kyler Kuehn	Postdoc	now at Argonne National Lab
Mandeep Gill	Postdoc	

Research

My area of research is experimental high energy physics. Over the last years I have expanded my program into the emerging field of experimental cosmology and the physics of medical imaging. The following gives a brief overview of my research activities in these three areas.

Research in High Energy Physics

My research in particle physics focuses on discovering the symmetries of nature and the properties of the fundamental particles and interactions. High energy physics is a collaborative effort and since 2002, I am a member of the BaBar collaboration. BaBar is an experiment at the Stanford Linear Accelerator Center. It is designed to investigate the asymmetry between matter and anti-matter (CP violation) and to perform many other studies of heavy quarks (charm and bottom) and leptons (tau). The experiment has been very successful and has produced a plethora of physics results. My research group has been involved in every aspect of the experiment from detector construction, daily operation to Monte Carlo simulation and, of course, physics analysis. Most recently, we contributed to the discovery of flavor oscillation in the charm quark sector which ranks among the top results in particle physics in 2007. This research effort is funded by the Department of Energy. Data-taking with BaBar ended in April 2008 and this effort is winding down. The last OSU BaBar student graduated September 2009 and we are finishing up the last two analysis projects.

Research in Medical Imaging

In collaboration with my colleague Harris Kagan I have been exploring new concepts in medical imaging such as a Compton camera. Using our expertise in silicon detector technology we are working with scientists from the University of Michigan and the European research center CERN on several medical imaging projects. The first project, the Compton prostate probe, takes advantage of Compton scattering in silicon sensors to increase the resolution of standard SPECT cameras. We have completed a prototype setup and our results at several IEEE/MIC meetings. A second project involves very high resolution small animal PET scanner based on high resolution silicon detectors. Our long term objective is to develop PET instrumentation for molecular imaging of small animals that has unprecedented spatial resolution and image quality. With our prototype systems we have already achieved sub-millimeter resolution and we are currently investigating if image blur can be further reduced by embedding the entire PET scanner in a strong magnetic field. There are many additional applications for silicon detectors in medical imaging devices. Currently, we are evaluating if these detectors can also be used as direct positron imaging probes (Beta-Probe). Our central hypothesis is that very small cancerous lesions (few milligram) can be effectively detected intra-operatively using a silicon-based radiation detector by counting beta particles and high-energy gamma rays emitted from positron emitters such as [18F] fluorodeoxyglucose (FDG). If such a probe is designed for laparoscopic procedures, it would open new perspectives for minimal invasive oncologic surgery. This research effort is funded by NIH and currently supports one graduate student.

Research in Experimental Cosmology

The surprising discovery that the universe is accelerating, not slowing down from the mass it contains, sets the stage for 21st century cosmology. Astro-physicists, astronomers, and high energy physicists are coming together to explore these fundamental questions and the mysteries of the so-called dark energy that makes up 70% of the universe. With strong support from the University we established the Center for Astro-Particle Physics and Cosmology (CCAPP) which features dark energy science as one of the center pieces of the scientific program. To find out why most of the universe is dark, large scale surveys of the sky with new ground based instruments have been proposed. We have joined the three most promising initiatives: the Dark Energy Survey (DES), the Baryon Oscillation Spectroscopic Survey (BOSS) and the Large Synoptic Survey Telescope (LSST). BOSS will map the distribution of galaxies and quasars to measure the characteristic scale imprinted by baryon acoustic oscillation in the early universe. DES and LSST in the future employ new, giga-pixel class CCD cameras and survey telescopes to study dark energy using several complementary approaches including weak gravitational lensing and the distribution of galaxy clusters. This research effort is funded by CCAPP and the Department of Energy and currently supports technical staff, postdoctoral researchers, a graduate student and several undergraduate students.