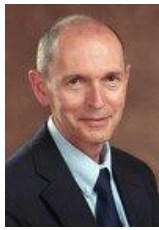


**Nomination of Professor Jim Miller for 2016 Rayleigh Award**  
*in recognition for pioneering sustained and high impact research in  
 ultrasonic tissue characterization and quantitative echocardiography*

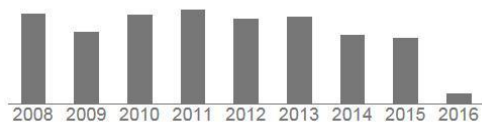


[JAMES G. MILLER](#) graduated Summa Cum Laude with an A.B. in Physics from St. Louis University in 1964, and received an M.A. in 1966 and a Ph.D. in 1969 from Washington University. Being a young, rising star researcher, he was invited to join the Washington University faculty in 1970 as an Assistant Professor of Physics, was promoted to Associate Professor with tenure in 1972, to full Professor in 1977, and was named Director of the Laboratory for Ultrasonics in 1987. Today Miller is Professor of Physics and holder of the Albert Gordon Hill Endowed Chair in the Faculty of Arts and Sciences. Miller also holds the rank of Professor of Medicine in the Washington University School of Medicine and Professor of Biomedical Engineering in the Washington University School of Engineering and Applied Science. For almost 5 decades, Miller has relentlessly and successfully sustained a record of ground-breaking research in the field of medical ultrasound. Professor Miller's research focuses on the physics of anisotropic, inherently inhomogeneous media. His systematic studies of the anisotropic properties of the heart have led to fundamentally new insights where his current investigations include studies of the physics underlying nonlinear ultrasonic propagation and the consequences on generalized dispersion relations of requirements of causality. His research has provided the basis for significantly improved diagnostic images of patients' hearts and has also been incorporated into commercially available echocardiographic imagers in widespread use throughout the world. Professor Miller is truly a world class leader in the field of Medical Ultrasound.

Miller's research in the field of myocardial tissue characterization is widely recognized and respected. In a series of manuscripts beginning in the late 1970s and continuing to the present, Miller and his collaborators pioneered the understanding of the role that myocardial anisotropy plays in echocardiographic imaging, contrast-enhanced imaging of the heart, and myocardial tissue characterization. Miller published numerous journal papers and gave many presentations in scientific fora dealing with ultrasonic myocardial tissue characterization and phase aberration effects. Now, 40 years later the phase aberration problem continues to represent a significant ultrasonic medical imaging challenge. Consequently, the myocardial tissue characterization remains a major research focus of Miller while he and his research collaborators have been reporting novel results in a significant number of publications on a regular basis since the mid 1970s. He has continued to focus on research studies that critically explore and enhance the role of nonlinear "harmonic" imaging in phase aberration reduction. Furthermore, he also has been investigating many important topics in the physics of medical ultrasound including: interaction of ultrasound with bloodpool contrast agents; contrast-enhanced imaging of the heart; and site-targeted contrast agents that may be useful for targeted drug delivery.

[Miller's publication list](#) includes more than 165 refereed manuscripts, 110 conference proceedings and book chapters, and upwards of 265 abstracts of presentations at national and international meetings. A search of Miller's publications' list yields more than 50 [Citations to](#) refereed manuscripts, conference proceedings, and abstracts of talks at major national and international meetings in which the term "anisotropy" appears in the title. Many of these results were first reported in presentations at the IEEE Ultrasonic Symposium. A product ("Lateral Gain Compensation" or "LGC"), introduced by Hewlett-Packard Medical Imaging in the 1990s when that company held the dominant market position in clinical echocardiography, was based on the results of Miller's investigations of the

Citation indices	All	Since 2011
Citations	11285	1919
h-index	59	22
i10-index	194	53



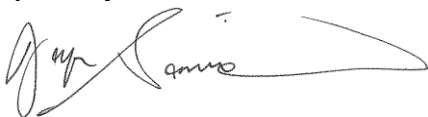
impact of myocardial anisotropy on echocardiographic imaging in the short-axis view. Recent studies of the heart using high speed time-reversal and plane-wave imaging by Mickael Tanter and Mathias Fink refer explicitly to the pioneering work of Miller's laboratory that paved the way for some of their work. Miller's lab is also known and respected for work in phase aberration correction, nonlinear ultrasonic imaging, and novel techniques for non-destructive evaluation.

Over the years, Miller's research has been supported by contracts with commercial firms and by major and numerous grants from the NSF, NASA, and NIH. The NIH recognizes researchers who have demonstrated superior competence and outstanding productivity with the highly selective MERIT (Method to Extend Research in Time) Award, which was awarded to one of Miller's NIH grants. Miller is well known and highly regarded internationally in the field of medical ultrasound and his contributions have already been recognized by many scientific organizations. His awards and recognition includes: IR-100 Award: Ultrasonic Microemboli Monitor, 1974; IR-100 Award: Acoustoelectric Receiving Transducer, 1978; Sigma Xi National Speaker, 1981-1982; Fellow of the American Institute of Ultrasound in Medicine, 1986; Fellow of the Acoustical Society of America, 1990; Fellow of The Institute of Electrical and Electronics Engineers, 1998; NIH Method to Extend Research in Time (MERIT) Award, 1998; Fellow of the American Institute for Medical and Biological Engineering, 2000; Silver Medal: Acoustical Society of America, 2004; Emerson Excellence in Teaching Award, 2004; IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society's Achievement Award, 2006; and Joseph H. Holmes Basic Science Pioneer Award: American Institute of Ultrasound in Medicine, 2014.

A total of 35 graduate students earned their PhDs in Miller's Laboratory for Ultrasonics, most of whom presented their research at the IEEE Ultrasonic Symposium. A significant number of MD and PhD post-doctoral members of Miller's lab have also gone on to prestigious academic careers including chaired professorships, department heads, and deans. Among the many undergraduate students who worked in Miller's lab was W.E. Moerner who shared in the 2014 Nobel Prize in Chemistry for his work in super-resolution imaging. Moerner, who is a Senior Member of the IEEE, delivered the research that he carried out under Miller's guidance as an oral presentation at the IEEE Ultrasonics Symposium in Milwaukee in 1974. For more than 40 years, Miller has taught an undergraduate course aimed at biomedical engineers and premedical students entitled "Physics of the Heart". That course has earned widespread respect and resulted in Miller's receiving the prestigious Emerson Teaching Award and the Outstanding Teacher Award from the Council of Arts and Sciences Students.

Miller's contributions to professional scientific societies have been exemplary. In particular, his involvement and leadership within the IEEE UFFC Society has been consistent over a span of 4 decades. Miller became a member of the Technical Program Committee of the IEEE Ultrasonics Symposium in 1975 and has served in that role continuously since then. Miller served four 3-year terms as an elected member to the IEEE UFFC AdCom beginning in 1977 and culminating with his fourth term which ended in December of 2015. He was named a Senior Member in 1979 and named a Fellow of the IEEE in 1998. Miller was awarded the IEEE UFFC Achievement Award in 2006.

Respectfully submitted



Jafar Saniie, VP Ultrasonics - IEEE UFFC Society

Endorsement



Jian-yu Lu, Junior Past President, IEEE UFFC Society