



Sami Gamal-Eldin Tantawi

Professor of Particle Physics and Astrophysics

 Curriculum Vitae available Online

Bio

BIO

For over a decade I have advocated for dedicated research efforts on the basic physics of room temperature high gradient structures and new initiatives for the associated RF systems. This required demanding multidisciplinary collaboration to harness limited resources. The basic elements of the research needed to be inclusive to address not only the fundamentals of accelerator structures but also the fundamentals of associated technologies such as RF manipulation and novel microwave power sources. These basic research efforts were not bundled with specific developments for an application or a general program. The emerging technologies promise a broad, transformational impact.

With this underlying philosophy in mind, in 2006 the US High Gradient Research Collaboration for which I am the spokesman was formed. SLAC is the host of this collaboration, which comprises MIT, ANL, University of Maryland and University of Colorado, NRL and a host of SBIR companies. This led to the revitalization of this research area worldwide. The international collaborative effort grew to include KEK in Japan, INFN, Frascati in Italy, the Cockcroft Institute in the UK, and the CLIC team at CERN.

This effort led to a new understanding of the geometrical effects affecting high gradient operations. The collaborative work led to new advances in understanding the gradient limits of photonic band gap structures. Now we have a new optimization methodology for accelerator structure geometries and ongoing research on alternate and novel materials. These efforts doubled the usable gradient in normal conducting high gradient linacs to more than 100 MV/m, thus revitalizing the spread of the technology to other applications including compact Inverse Compton Scattering gamma-ray sources for national security applications, and compact proton linacs for cancer therapy.

ACADEMIC APPOINTMENTS

- Professor, Particle Physics and Astrophysics
- Member, Stanford Cancer Institute

ADMINISTRATIVE APPOINTMENTS

- Chief Scientist, Accelerator Technology Research Division, SLAC National Accelerator laboratory, (2014- present)
- Professor, Particle Physics and Astrophysics Department, (2012- present)
- Group Leader/Accelerator Technology Research Department Head, Stanford Linear Accelerator Center, (2006-2012)
- Associate Professor with Tenure, Physics and Astrophysics Department, (2005-2012)
- Associate Professor, Physics and Astrophysics Department, (2002-2005)
- High Power RF Group Leader., Stanford Linear Accelerator Center, Accelerator Research Department A, (1999-2006)

HONORS AND AWARDS

- Fellow, , American Physical Society (2005)
- Prize for achievements in accelerator physics and technology, US Particle Accelerator School (2003)

Publications

PUBLICATIONS

- **Variational Self-Consistent Theory for Beam-Loaded Cavities** *PHYSICAL REVIEW APPLIED*
Naji, A., Tantawi, S.
2021; 16 (4)
- **Experimental demonstration of particle acceleration with normal conducting accelerating structure at cryogenic temperature** *PHYSICAL REVIEW ACCELERATORS AND BEAMS*
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- **Design and demonstration of a distributed-coupling linear accelerator structure** *PHYSICAL REVIEW ACCELERATORS AND BEAMS*
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Berlin, A., D'Agno, R., Ellis, S. R., Nantista, C., Neilson, J., Schuster, P., Tantawi, S., Toro, N., Zhou, K.
2020
- **Novel High-Power Microwave Circulator Employing Circularly Polarized Waves** *IEEE TRANSACTIONS ON PLASMA SCIENCE*
Franzi, M. A., Tantawi, S., Dolgashev, V., Jongewaar, E., Eichner, J.
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- **Initial Steps Towards a Clinical FLASH Radiotherapy System: Pediatric Whole Brain Irradiation with 40 MeV Electrons at FLASH Dose Rates.** *Radiation research*
Breitkreutz, D. Y., Shumail, M. n., Bush, K. K., Tantawi, S. G., Maxim, P. G., Loo, B. W.
2020
- **Modular High Power RF Sources for Compact Linear Accelerator Systems**
Weatherford, B., Kemp, M., Lu, X., Merrick, J., Nanni, E., Neilson, J., Sy, A., Tantawi, S., IEEE
IEEE.2020: 55-56
- **A THz-Driven Field Emission Electron Gun**
Lewis, S. M., Merrick, J., Othman, M. K., Haase, A., Tantawi, S., Nanni, E. A., IEEE
IEEE.2020

- **High Gradient and of Breakdown Measurements in a Millimeter-Wave Accelerating Cavity**
Othman, M. K., Picard, J., Schaub, S., Dolgashev, V. A., Lewis, S., Spataro, B., Temkin, R. J., Tantawi, S., Nanni, E. A., IEEE
IEEE.2020
- **Development of a millimeter-period rf undulator** *PHYSICAL REVIEW ACCELERATORS AND BEAMS*
Toufexis, F., Tantawi, S. G.
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- **PHASER: A platform for clinical translation of FLASH cancer radiotherapy.** *Radiotherapy and oncology : journal of the European Society for Therapeutic Radiology and Oncology*
Maxim, P. G., Tantawi, S. G., Loo, B. W.
2019
- **Next generation high brightness electron beams from ultrahigh field cryogenic rf photocathode sources** *PHYSICAL REVIEW ACCELERATORS AND BEAMS*
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- **Ultra-high brightness electron beams from very-high field cryogenic radiofrequency photocathode sources**
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- **Efficient dual space source interpolation method for the numerical solution of self-consistent static beam-wave interactions** *PHYSICAL REVIEW ACCELERATORS AND BEAMS*
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2018; 21 (10)
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 - **Compact Linac-Driven Light Sources Utilizing mm-period RF Undulators**
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 - **High Gradient mm-Wave Metallic Accelerating Structures**
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 - **First High Power Results from the 57.12 GHz 5th Harmonic Frequency Multiplier**
Toufexis, F., Tantawi, S. G., Jensen, A., Dolgashev, V. A., Haase, A., Fazio, M., Borchard, P., IEEE
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- **Experimental measurements of rf breakdowns and deflecting gradients in mm-wave metallic accelerating structures** *PHYSICAL REVIEW ACCELERATORS AND BEAMS*
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- **Comparison of film measurements and Monte Carlo simulations of dose delivered with very high-energy electron beams in a polystyrene phantom** *MEDICAL PHYSICS*
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- **Characterization of thick conducting molybdenum films: Enhanced conductivity via thermal annealing** *SURFACE & COATINGS TECHNOLOGY*
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- **Design and analysis of a radial X-band klystron**
Dal Forno, M., Tantawi, S. G., Ruth, R. D., Jensen, A., IEEE
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- **X-Band Multi-Beam Klystron Design and Progress Report**
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