Paul A. Trunfio
Boston University
590 Commonwealth Avenue
Department of Physics
590 Commonwealth Avenue
Boston, Massachusetts 02215 USA

Office: Metcalf Science Center, Room 200A
Tel: +1.617.353.9041
Fax: +1.617.353.9393
Email: trunfio@bu.edu
Web: http://polymer.bu.edu/paul

Paul A. Trunfio is a Senior Research Scientist and member of the Complex Systems Collaborative in the Department of Physics, and fellow at the Hariri Institute for Computing and Computational Science & Engineering at Boston University. As an undergraduate student in the mid 1980s, my "light bulb" moment was in a computational science lab, creating models and visualizations of complex systems. I made my professional focus the integration of interdisciplinary science research with K-20+ STEM (Science Technology Engineering and Mathematics) education, leading efforts to bridge the two by developing computer-based tools, curricula, training programs and mentoring partnerships.

In my 31 years at Boston University, I have co-authored and co-led 22 peer-reviewed grants and related awards with science education and learning research funding of over $26M. I co-led some of the early efforts to develop and study effectiveness of technology-enriched science education. At that time, the early 1990s, computational tools were practically unheard of in schools. Our solution was to bring high-end computers directly into schools, allowing students to compute and visually render real-time models such as the dynamics of molecular networks in fully immersive three-dimensional stereoscopic environments. We developed computational tools and curricula, led summer workshops for hundreds of teachers nationally and internationally, hosted high school teacher, undergraduate and high school internship programs and have created interactive exhibits at the Boston Museum of Science and at museums worldwide.

For the past decade, I have been building bridges between *cyberlearning* and research in data, network and systems science. I co-led the creation of the *NetSci High* program, connecting high school students underrepresented in STEM with university research labs. Each year, the program begins with an intensive residential summer workshop using the lens of network thinking to explore real-world problems. Students and teachers are introduced to network science foundations including graph theory, statistical inferencing, data mining, systems theory, and information visualization. On a practical level, students learn computational skills for visualizing and analyzing data using Gephi, Python, and Processing. We motivate and inspire through team-building activities, mini-projects, integrating STEM with art and design, non-technical interactive talks by leading researchers, and more. We strive to tear down the walls between student, teacher and researcher so that by the end of our workshops, student teams are armed with tools – and confidence – to embark on a year-long journey of independent discovery along with graduate student and teacher mentors.

I have focused my efforts on synthesizing, sustaining and scaling this initiative as a model for strengthening STEM pathways and workforce development as well as increasing capacity for broadening impacts of research. In 2018, I launched the Data & Network Science in K-20 Education initiative to explore best ideas and strategies for bridging university research, undergraduate education, K-12 students and teachers, school and district administration, parents, local, state and federal governments, industry, community organizations, and others. These efforts have led to the 2020 funding of the *Network Science for All* program by the National Science Foundation, a unique collaboration between the Department of Physics, Wheelock College of Education and Human Development, BU Government and Community Affairs, Sociedad Latina and Boston Public Schools.

I also teach in the introductory physics courses sequence, helping undergraduate students learn fundamental physics concepts that are at the heart of how our physical world works while promoting the development of problem-solving skills. I always strive to make connections to real-world applications that are related to students' career goals through examples and interactive physics demonstrations within the context of an active learning environment.

My education background includes undergraduate studies in biomedical engineering, graduate coursework in computer science and graduate research in statistical physics, co-authoring peer-reviewed research in such journals as Nature, Physical Review and Physical Review Letters. I am a fellow of the Massachusetts Academy of Sciences and member of the National Association of Research in Science Teaching and National Science Teachers Association.

Community service is an integral part of my life. I am an active volunteer in community programs and societal issues, that are all about providing opportunities and removing barriers to growth through education and mentoring. I am engaged in bringing awareness to the long-lasting effects of child abuse, as well as seeking pathways for emotional healing regardless of the cause.