

Electronics Science & Technology Division  
4555 Overlook Ave S.W.  
Washington, DC 20375

October 24, 2018

Texas Tech University,  
Physics & Astronomy Department,  
Box 41051, Lubbock, TX 79409-1051

Dear Committee Members,

Please consider my application for the advertised Assistant Professor position (15145BR) in experimental condensed matter Physics in the Physics and Astronomy Department at Texas Tech University. I have been informed about this position by Prof. T. Maccarone.

I have been a postdoctoral fellow of the American Society for Engineering Education (ASEE) residing at the Naval Research Laboratory (NRL) since June 2016. My research at NRL has focused on novel nanostructure compositions for light manipulation and confinement beyond the diffraction limit for next generation photonic applications. In parallel I investigate the ultrafast dynamical processes in nanomaterials. I received my Ph.D. in Physics from Kansas State University, while most of my doctoral research was performed at Columbia University. Later on, I was employed as a postdoctoral fellow at Iowa State University/Ames Laboratory, Stanford University/SLAC, and University of Southern California.

I am very much interested in this position because its scope of research and teaching, as well as its impact on the world. Moreover, I am very much fascinated by the college's culture of interdisciplinary research and educational programs that applies research findings to real-world solutions for next generation photonic applications.

The *Ultrafast Spectroscopy of Quantum Materials Laboratory* (USQML) that I envision establishing would serve the Physics & Astronomy department and the Nano Tech Center in providing characterization of materials and devices in the ultrafast timescale. The mission in research and education of the Physics & Astronomy department at the TTU is well aligned with my research plan and teaching philosophy, thus motivating me to apply for this position. Moreover, my research in quantum materials is very well aligned with the one of the 10 big ideas (*Quantum Leap: Leading the next quantum revolution*) of NSF's broad portfolio of investment in future, as well as with the National Quantum Initiative (NQI), which is a collaborative alliance among industry, academia and government to raise awareness of photonics and the impact of photonics on our everyday lives. Therefore, I will be an asset in the Physics department's efforts in research, and funds attraction.

While I have pursued diverse research threads on a variety of scientific problems, my experience is centered around a cohesive program driven by the idea of understanding the fundamental properties of materials, thus allowing the customization of these materials and their use as building blocks for next generation photonic and electronic devices. In particular, my research has focused on the study of the optical and electronic properties of nanoscale materials and structures (e.g. graphitic materials, dichalcogenides). As the motion of electron and nuclei in materials occur in

femtosecond time scale, I use ultrafast spectroscopic techniques to probe these excitations from UV to THz frequencies. In addition, I investigate the new approaches for light manipulation and confinement beyond the diffraction limit by nanostructures that potentially can be used for next generation nanophotonic devices, and I investigate the novel methods for generation/controlling the THz radiation. Moreover, as evidenced by my publications record, I have served as primary author and co-author in 17 scientific publications (including a single-author paper), and been awarded a \$25K Provost's Postdoctoral Scholar Research Grant for pursuing my independent research at the University of Southern California.

Interdisciplinary collaborations have played a significant role in my work for promoting scientific discovery in physical sciences. I look forward to developing robust collaborations within the college (e.g. with faculty members associated with the Nano Tech center at TTU) and across the university, but also around the world and the industry, for increasing societal impact. Potential collaborations are described in my research statement.

While I am very passionate about identifying new research directions and pushing the frontiers of knowledge, I also value the importance of disseminating engineering skills and scientific knowledge to the next generations. I was fortunate enough to mentor undergraduate and graduate students, which has been one the most rewarding and mentally stimulating experiences of my academic training. I am eager to apply active learning techniques in class to increase student engagement and strengthen their understanding of the material. I look forward to teaching courses of the curriculum and developing new ones, e.g. ultrafast spectroscopic techniques.

I strongly believe that the research, teaching, and outreach skills I have developed through my education and research experience would make me a valuable addition to Texas Tech University faculty. Enclosed you will find my curriculum vitae, research and teaching statement, the list of my publications, a list of references, and a document with my research background. I would greatly appreciate the opportunity to further discuss my qualifications with you. Thank you for your time and consideration.

Sincerely,  
Ioannis Chatzakis, Ph.D