Physics Colloquium

Michigan Technological University
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4:00 pm
Room 139 Fisher Hall

Non-linear Physics: an Essential Component of Classical Music

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Abstract: When one thinks of the music of composers such as Brahms, Strauss, Wagner or Tchaikovsky, to name a few, one does not ordinarily associate them with Physics. However, in this more-general-than-normal physics talk it will be demonstrated that, in contrast to many examples from popular music, non-linear physics is necessary to understand how classical music can be played and how it will sound. Linear physics problems, including studies of normal mode vibrations and resonance, are very common in the study of physics at all levels. In contrast, non-linear problems, which are quite common in everyday life, are often extremely difficult to solve and are largely absent even from the advanced physics curriculum. The sound generation for all the bowed and blown musical instruments will be specifically discussed. It will be demonstrated that non-linear physics is essential to explain how such instruments generate sound, why the overtones generated when playing such instruments are harmonically locked, and in general why the instruments sound as they do. That is, it will be demonstrated that non-linear physics is indeed an essential part of the performance of the music of composers such as Brahms, Strauss, Wagner, and Tchaikovsky, to name a few.

Biography: Professor Suits received his PhD from the University of Illinois and spent his post-doc years at the University of Pennsylvania. Since 1985 he has been at MTU using nuclear magnetic resonance (NMR) and nuclear quadrupole resonance (NQR) to study solids, pursue NMR and NQR imaging methods, and to develop the use of NQR for explosive detection. During the last several years he has become interested in issues related to the Physics behind the production and performance of music and has developed the course PH1090 – The Physics Behind Music.

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