**ΠΑΝΕΠΙΣΤΗΜΙΟ ΙΩΑΝΝΙΝΩΝ**

**ΤΜΗΜΑ ΜΑΘΗΜΑΤΙΚΩΝ**

Εβδομαδιαίο Σεμινάριο

# Nonlinear Waves in Granular Crystals: From Modeling and Analysis to Computations and Experiments

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In this talk, we will provide an overview of results in the setting of granular crystals, consisting of spherical beads interacting through nonlinear elastic spring-like forces. These crystals are used in numerous engineering applications including, e.g., for the production of "sound bullets" or the examination of bone quality. In 1d we show that there exist three prototypical types of coherent nonlinear waveforms: shock waves, traveling solitary waves and discrete breathers. The latter are time-periodic, spatially localized structures. For each one, we will analyze the existence theory, presenting connections to prototypical models of nonlinear wave theory, such as the Burgers equation, the Korteweg-de Vries equation and the nonlinear Schrodinger (NLS) equation, respectively. We will also explore the stability of such structures, presenting some explicit stability criteria for traveling waves in lattices. Finally, for each one of these structures, we will complement the mathematical theory and numerical computations with state-of-the-art experiments, allowing their quantitative identification and visualization. Finally, time permitting, ongoing extensions of these themes will be briefly touched upon, most notably in higher dimensions, in heterogeneous or disordered chains and in the presence of damping and driving; associated open questions will also be outlined.

Πέμπτη 20 Φεβρουαρίου 2020, 18:00        Αίθουσα 201α Τμήματος Μαθηματικών

*Μετά την ομιλία ακολουθεί καφές και συζήτηση στο εντευκτήριο του Τμήματος*