Condensed Matter Seminar

Title: Isostaticity and a Unified View of Soft Elasticity

Speaker: **Dr. Xiaoming Mao**

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Department of Physics,
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DATE: 11 / 9 / 2012, Friday

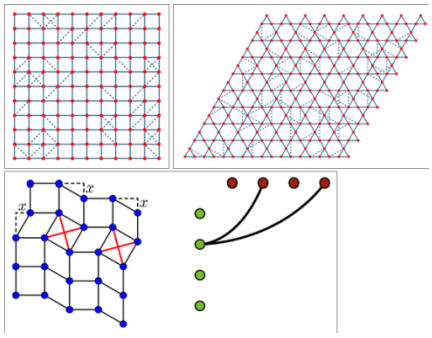
Time: 2:00pm ~ 3:00pm

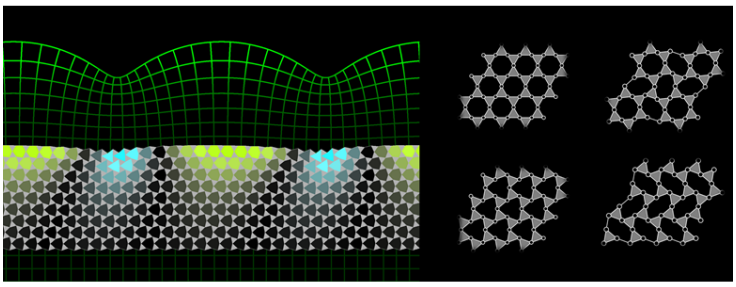
Place: Room 245, Physics Building

Abstract:

Mechanical stability is an important concept in fields ranging from civil engineering to physics and biology. In 1864, James Clerk Maxwell constructed a theory for the mechanical rigidity of frames composed of straight struts connected at points. Isostatic frames in which the number of degrees of freedom is equal to the number of constraints are of special interest. They are rigid but the removal of one strut introduces a zero energy deformation mode.

Isostaticity provides a unifying framework for many materials in nature, from glasses to jammed solids to networks of semi-flexible polymers. In this talk I will discuss my recent work on the fascinating physics of nearly isostatic periodic lattices. Topics I will discuss include the general phenomena of dimensional crossover and scaling relations in elastic response and phonon spectra of isostatic lattices, and analytical treatments of these lattices revealing rich physics of jammed solids and semi-flexible networks. I will also discuss the unusual physics of a class of two-dimensional isostatic lattices that display a negative Poisson's ratio, zero-energy edge states, and emerging conformal symmetry.





Any questions to Takeshi Sakamoto, 313-577-2970 or ee4243@wayne.edu