Abstract Submitted
for the OSS18 Meeting of
The American Physical Society

Mechanism of Auxetic Structures Designed and Fabricated with 3D Printer[1] MARTHA MATA, XIN DU[2], Aquinas College — Metamaterials are bulk objects with special mechanism properties defined by their repetitive inner structures, rather than the materials they are made of. One of the special mechanisms is "auxetic behavior": when the materials are stretched in one direction, unlike conventional materials, they will also expand in the lateral direction. In this project we studied the dependence of Poisson's Ratio on the geometric parameters of auxetic structures. We used 3-D printer to efficiently design and produce honeycomb auxetic structures. With an innovative experimental setup and image analysis techniques, we are able to study the pulling force and the corresponding lateral expansion of auxetic structures with various geometric parameters. Also, we found a linear relationship between the Poisson's Ratio and the geometric parameter of the honeycomb auxetic structure. Our result is consistent with theoretical analysis.

[1]Mohler-Thompson Scholarship
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Date submitted: 27 Feb 2018 Electronic form version 1.4