

# 青山学院大学 物理科学科 コロキウム

2025年度 第2回

下記の通りコロキウムを企画致しました。学生や分野の違う方にもわかるレベルから始めて下さるようお願いしてあります。どなた様もご自由に是非ご聴講ください（事前参加登録なし）。

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「主催：物理科学科、基礎科学コース、機能物質創成コース」

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**講演者** Tim Chen 氏 (University of Houston)

**日 時** 10月3日（金） 16:45 から

**場 所** 青山学院大学 理工学部 L棟6階 L 603室

**講演題目** Mechanical multi-stability towards robotic intelligence

Three-dimensional architectures with complex curvature are essential for human-centric applications across length scales, ranging from microscopic biomedical implants to extraterrestrial habitats. Yet, most mass manufacturing methods remain optimized for two-dimensional flat substrates. Whether in silicon wafers or construction materials, 2D fabrication capabilities are far more advanced than direct 3D manufacturing. We present two engineering systems that exploit mechanical auxeticity, bistability, and discrete conformal mapping to generate 3D architectures from fabricated 2D precursors. In the first, we design architected polyimide sheets whose bistable unit cells deploy into free-standing 3D structures. By conformally flattening a target 3D mesh to 2D and locally tuning each unit's microstructure, we ensure that their secondary equilibria achieve the prescribed isotropic expansion, yielding a spatially heterogeneous tessellation with controlled Gaussian curvature. In the second, we explore meter-scale deployable structures intended for off-planet construction. Flat or tubular precursors are robotically assembled from overlapping panels, which rotate to form load-bearing 3D geometries upon deployment. These are designed for ease of stowage and transportation, as well as for simple deployment mechanism. Together, these approaches leverage mature 2D manufacturing technologies to create 3D structures and devices with properties previously infeasible through direct 3D fabrication.

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