1. Record Nr. UNISA996418435903316

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Titolo: Geometric Control of Fracture and Topological Metamaterials [[electronic resource] /] / by Noah Mitchell

Pubbl/distr/stampa: Cham : , : Springer International Publishing : , : Imprint : Springer, , 2020

ISBN: 3-030-36361-9

Edizione: [1st ed. 2020.]

Descrizione fisica: 1 online resource (XIX, 121 p. 49 illus., 48 illus. in color.)

Collana: Springer Theses, Recognizing Outstanding Ph.D. Research, , 2190-5053

Disciplina: 620.11

Soggetti:
Solid state physics
Optical materials
Electronic materials
Physics
Phase transitions (Statistical physics)
Solid State Physics
Optical and Electronic Materials
Mathematical Methods in Physics
Phase Transitions and Multiphase Systems

Lingua di pubblicazione: Inglese

Formato: Materiale a stampa

Livello bibliografico: Monografia

Nota di contenuto: Chapter1: Introduction -- PartI: Gaussian Curvature as a Guide for Material Failure -- Chapter2: Fracture in sheets draped on curved surfaces -- Chapter3: Conforming nanoparticle sheets to surfaces with gaussian curvature -- PartII: Topological mechanics in gyroscopic metamaterials -- Chapter4: Realization of a topological phase transition in a gyroscopic lattice -- Chapter5: Tunable band topology in gyroscopic lattices -- Chapter6: Topological insulators constructed from random point sets -- Chapter7: Conclusions and outlook.

Sommario/riassunto: This thesis reports a rare combination of experiment and theory on the role of geometry in materials science. It is built on two significant findings: that curvature can be used to guide crack paths in a predictive way, and that protected topological order can exist in amorphous materials. In each, the underlying geometry controls the elastic

behavior of quasi-2D materials, enabling the control of crack propagation in elastic sheets and the control of unidirectional waves traveling at the boundary of metamaterials. The thesis examines the consequences of this geometric control in a range of materials spanning many orders of magnitude in length scale, from amorphous macroscopic networks and elastic continua to nanoscale lattices.