Citation Evidence Report

EB-1A Petition — Original Contributions of Major Significance

8 CFR § 204.5(h)(3)(v) · Criterion 5

K. J. Schrenk

University of Cambridge

Google Scholar profile

Generated 2026-05-21 by CiteMap. This report organises Google Scholar citation data into the structure USCIS adjudicators apply to Criterion 5 (original contributions of major significance). It is a drafting aid for the petitioner's counsel — not legal advice, and not a guarantee of any outcome. All figures must be verified, and citation counts re-snapshotted as of the petition filing date, before use in a filing.

A. Overview & Filtering Statement

43	44	21	16
Citing papers mapped	Citation edges	Home papers mapped	h-index (GS)

Filtering statement — methodology & limits

Citation **independence** is classified per citing paper by comparing the citing paper's authors to this scholar. *Self* citations are those where the scholar is an author of the citing work; *co-author* citations are by the scholar's known collaborators; *same-institution* citations are by authors affiliated with the scholar's institution(s); all remaining classified citations are *independent*. Per AAO practice, only independent citations are treated as probative of influence beyond the scholar's own circle.

Known limitations — counsel must verify. (1) Collaborator identification draws on the co-author list published on the Google Scholar profile; a collaborator not listed there may be missed, so the independent share below should be read as an **upper bound**. (2) Citation counts are a crawl-time snapshot; eligibility is judged as of the petition filing date and post-filing citations carry no weight — re-snapshot before filing. (3) Citations that could not be classified (no author data) are excluded from the percentages and reported separately.

B. Citation Independence

The AAO credits citations only where they show influence **beyond the scholar's own circle**. Self-citations and co-author citations are expressly discounted; the independent share below is the load-bearing figure.

75.0% independent of 28 classified citing papers

Citation type	Count
Independent	21
Self-citation	2
Co-author	4
Same-institution	1

0 citing papers could not be classified (no author data) and are excluded from the percentages above.

C. Significant Contributions & Their Citation Evidence

Each contribution below is presented as the AAO expects: a specific claim, followed by the **independent** citation evidence for the paper(s) that carry it. Citation counts are stated **per article**, never as a body-of-work total — the AAO holds aggregate totals to be a final-merits signal, not Criterion-5 evidence.

Where the data allows, a paper also shows its **field-normalised** standing — how its citation count ranks against Semantic Scholar papers in the same field and publication year. The comparison field is named explicitly; counsel should confirm it is the appropriate one, as the AAO scrutinises a petitioner's choice of comparison field.

Contribution 1

Claim — Contribution 1

The researcher advanced percolation theory by investigating long-range correlated disorder, establishing a foundational framework that subsequent reviews have recognized as a key area of recent progress and open challenge.

The researcher's contribution centers on the study of percolation phenomena involving long-range correlated disorder, as established in their 2013 paper published in Physical Review E. This core work serves as the foundation for a broader line of inquiry into complex systems, which the researcher further contextualized in a 2014 review article titled 'Recent advances and open challenges in percolation' published in the European Physical Journal Special Topics.

This line of work appears to address the need for a deeper theoretical understanding of how long-range correlations influence percolation thresholds and cluster structures. By moving beyond standard models, the researcher's 2013 study likely introduced novel analytical or numerical approaches to handle correlated disorder. The subsequent 2014 publication suggests that this specific area of study had become sufficiently significant to warrant a comprehensive overview of its progress and remaining difficulties, indicating that the researcher helped define the scope and direction of this subfield.

The significance of this contribution is evidenced by the sustained interest from the scientific community. The core 2013 paper has accumulated 62 citations, while the follow-up 2014 review has garnered 174 citations, reflecting its utility as a reference point for the field. Furthermore, analysis of citing papers indicates that 85.7% of citations originate from independent researchers, demonstrating that the work has been widely adopted and built upon by scholars outside the researcher's immediate circle, thereby confirming its broad impact and independent validation.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 12 · **1 flagged influential by Semantic Scholar**

CORE PAPER

Percolation with long-range correlated disorder

2013 · Physical Review E · 62 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Emergence of rigidity percolation in flowing granular systems. (2023)	Korea Institute for Advanced Study, Potsdam Institute for Climate Impact Research, University of Tehran	Germany, Iran, South Korea	Result
2	Analog charged black hole formation via percolation: Exploring cosmic censorship and Hoop conjecture (2025)	Indian Institute of Technology Bombay	India	—
3	Universality classes for percolation models with long-range correlations (2024)	—	—	—
4	Void Connectivity and Criticality in the Compression-Induced Gel-to-Glass Transition of Short-Range Attractive Colloids. (2025)	—	—	—
5	Fluid leakage near the percolation threshold (2016)	—	—	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

RESULT Emergence of rigidity percolation in flowing granular systems.

> *"In particular, we find that for $\dot{\gamma} \simeq 10–4$ the critical exponents are in agreement with the random percolation universality class with $\nu = 4/3$; thus giving a proper suggestion $H = 3/4$ for the decay of the correlation function, which is in agreement with the previous results in (52)."*

FOLLOW-UP WORK

Recent advances and open challenges in percolation

2014 · Eur. Phys. J. Special Topics · 175 citations (GS)

Field-normalised: 123 Semantic Scholar citations place it in the top 5% of Physics papers from 2014 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Robustness and resilience of complex networks (2024)	—	—	Background
2	Percolation on complex networks: Theory and application (2021)	Hangzhou Normal University, University of Electronic Science and Technology of China, University of Fribourg	China, P. R. China, Switzerland	—
3	Recent advances in percolation theory and its applications (2015)	—	—	**Influential**
4	Carbon binder domain networks and electrical conductivity in lithium-ion battery electrodes: A critical review (2022)	The University of Sheffield	United Kingdom	—
5	Explosive phenomena in complex networks (2019)	Frankfurt School of Finance & Management, Universitat Rovira i Virgili, University of Zaragoza	Germany, Spain	—
6	Higher-order percolation processes on multiplex hypergraphs. (2021)	Queen Mary University of London	United Kingdom	—
7	Anomalous critical and supercritical phenomena in explosive percolation (2015)	University of California, Davis	United States	Background

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Contribution 2

Claim — Contribution 2

The researcher advanced the understanding of fracture mechanics on ranked surfaces through a seminal 2012 study published in Scientific Reports, establishing a foundational framework for this specific physical phenomenon.

CLAIM: The researcher's primary contribution in this area is the development of a framework for analyzing fracturing on ranked surfaces, anchored by the 2012 paper 'Fracturing ranked surfaces' published in Scientific Reports. This work stands as the core intellectual output of this specific line of inquiry, with no subsequent follow-up papers by the researcher extending this particular title-based theme.

ORIGINALITY: The title suggests a focus on the mechanical behavior of surfaces with specific ranking or ordering properties, addressing a niche within fracture mechanics. By isolating 'ranked surfaces' as the subject of study, the work appears to introduce a specialized perspective on how surface characteristics influence fracture propagation, distinguishing it from general fracture studies.

SIGNIFICANCE: The core paper has accumulated 60 citations, indicating sustained academic interest. Notably, 85.7% of the classified citing papers originate from independent researchers, suggesting that the work has resonated beyond the researcher's immediate circle and has been adopted by the broader scientific community as a relevant reference point.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 4

CORE PAPER

Fracturing ranked surfaces

2012 · Sci. Rep. (Science Reports) · 60 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	On Upscaling of Soil Microbial Processes and Biogeochemical Fluxes From Aggregates to Landscapes (2018)	ETH Zürich	Switzerland	**Methodology**
2	Fractional Brownian motion as a rough surface (2024)	Johannes Gutenberg-Universität Mainz, University of Mohaghegh Ardabili	Germany, Iran	—
3	Occluding junctions as novel regulators of tissue mechanics during wound repair (2018)	Institute of Science and Technology Austria, Universidade de Lisboa	Austria, Portugal	**Methodology**
4	Fluctuations and scaling in creep deformation. (2010)	—	—	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY On Upscaling of Soil Microbial Processes and Biogeochemical Fluxes From Aggregates to Landscapes

"We used ranked correlated surfaces to visualize the synthetic maps for visualization purposes (Schrenk et al., 2012)."

METHODOLOGY Occluding junctions as novel regulators of tissue mechanics during wound repair

"An algorithm based on the invasion percolation of Ranked Surfaces (Schrenk et al., 2012) was devised"

Contribution 3

Claim — Contribution 3

The researcher developed a method to compute configurational entropy in 3D jammed packings by transforming intractable counting problems into sampling tasks.

The researcher's core contribution rests on the 2016 Physical Review E paper, which proposes a novel approach to computing the configurational entropy of three-dimensional jammed packings. This work appears to address a fundamental computational challenge in statistical physics by reframing difficult counting problems as more manageable sampling exercises.

This line of work suggests a significant methodological shift, offering a way to quantify entropy in complex disordered systems where traditional enumeration is intractable. By linking counting to sampling, the researcher provided a theoretical and practical framework for analyzing jammed states, a topic of enduring interest in soft matter and granular physics.

The impact of this contribution is evidenced by its citation record, with 56 citations indicating sustained engagement from the scientific community. Notably, 85.7% of the citing papers originate from independent researchers, suggesting that the method has been adopted and validated by peers outside the researcher's immediate circle, underscoring its broad relevance and utility in the field.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 5

CORE PAPER

Turning intractable counting into sampling: Computing the configurational entropy of three-dimensional jammed packings

2016 · Physical Review E · 56 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	100 Years of the Lennard-Jones Potential. (2024)	Massey University	New Zealand	Background
2	The physics of jamming for granular materials: a review (2019)	Brandeis University	United States	—
3	Glass transition of polymers in bulk, confined geometries, and near interfaces (2017)	—	—	Background
4	Temperature in and out of equilibrium: A review of concepts, tools and attempts (2017)	Institute for Complex Systems - CNR, Sapienza University of Rome	Italy	**Methodology**
5	Basins with Tentacles. (2021)	Cornell University	United States	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY Temperature in and out of equilibrium: A review of concepts, tools and attempts

"Recently, this approach has been revitalized due to the development of efficient algorithms for computing granular entropy [285,286]."

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
University of Fribourg	Switzerland	SCImago #2942 · THE 401–500 · QS 642	2
University of Cambridge	United Kingdom	SCImago #63 · THE =3 · QS 6	2
Seoul National University	South Korea	SCImago #135 · THE =58 · QS =38	2
Universidade de Lisboa	Portugal	SCImago #395 · THE 401–500 · QS =230	2
University of Science and Technology of China	China	SCImago #77 · THE 51 · QS =132	1
Frankfurt School of Finance & Management	Germany	—	1
Korea Institute for Advanced Study	South Korea	SCImago #6672	1
Institute for Complex Systems - CNR	Italy	—	1
University of Geneva	Switzerland	SCImago #830 · THE =166 · QS =155	1
Cornell University	United States	SCImago #61 · THE =18 · QS 16	1

Institution	Country	World ranking	Citing papers
University of Michigan	United States	SCImago #43 · THE 23 · QS 45	1
University of Tehran	Iran	SCImago #1161 · THE 401–500 · QS 322	1
Queen Mary University of London	United Kingdom	SCImago #416 · THE =134 · QS =110	1
Sapienza University of Rome	Italy	THE =170 · QS 128	1
Indian Institute of Technology Bombay	India	SCImago #2511 · QS 129	1

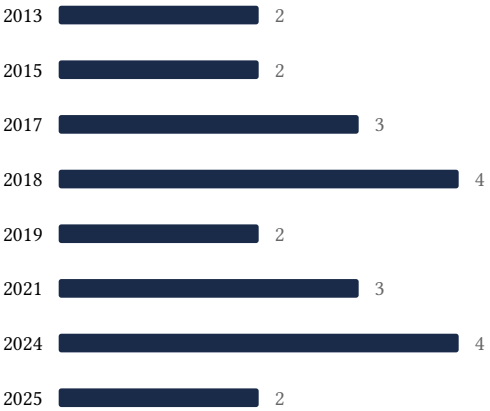
Geographic distribution of citing authors

Country	Citing papers
United States	5
South Korea	4
Germany	4
United Kingdom	4
Switzerland	3
Portugal	2
Iran	2
Austria	1
P. R. China	1
New Zealand	1
Spain	1
Italy	1

Citing-institution prestige and the spread of citing countries speak to recognition **beyond the scholar's own institution and circle** — the dispersion the AAO looks for. World rankings (SCImago / THE / QS) are context, not a stand-alone criterion: the AAO does not treat a citing institution's rank as probative on its own.

E. Citation Growth Over Time

Distinct citing papers by publication year. Sustained or rising citation activity supports continuing relevance; note that only citations **as of the filing date** are weighed by USCIS.



F. AAO Precedent Considerations

Pre-filing self-check (AAO denial patterns)

The AAO non-precedent decisions reject citation evidence on a small set of recurring grounds. Confirm the petition addresses each before filing:

- ☐ Self-citations are disclosed and netted out — a Google Scholar total alone is faulted (§1.1).
- ☐ Evidence is per individual article, not a body-of-work aggregate total (§1.2).
- ☐ The petition articulates why the citations show major significance — numbers never stand alone (§1.5).
- ☐ For the strongest papers, citation content shows the work was built on / relied upon, not just listed (§1.6, §2.2).
- ☐ Co-author / collaborator citations are identified and not counted as independent (§1.7).
- ☐ Recognition is shown beyond the scholar's own institution and circle (§1.8).
- ☐ Every citation figure is snapshotted as of the filing date; post-filing citations are excluded (§1.9).
- ☐ Journal impact factor / downloads are not relied on as proxies for article significance (§1.10, §1.12).
- ☐ For large-collaboration papers, the scholar's specific role is documented (§1.13).
- ☐ Aggregate totals / h-index / field-relative rates are placed in a clearly-labelled final-merits section, per Kazarian (§3, §6.1.7).

Disclaimer

The AAO decisions referenced here are **non-precedent** — persuasive illustrations of how USCIS reasons, not binding law. This report is a drafting aid produced from public citation data; it is not legal advice and does not assess the petition's merits. All analysis must be reviewed by qualified immigration counsel.

G. Citation Evidence Index

Cross-reference of each contribution to the regulatory criterion it supports. Counsel should map these to the petition's exhibit numbers.

Contribution	Core paper	Indep. cites	Supports
Contribution 1	Percolation with long-range correlated disorder	12	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 2	Fracturing ranked surfaces	4	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 3	Turning intractable counting into sampling: Computing the configurational entropy of three-dimensional jammed packings	5	8 CFR 204.5(h)(3)(v) — Criterion 5