To,
The Chief Editor,
Nature Physics.
Springer Nature Limited. 26th August 2025.

Subject: Request for Reconsideration – *Mott Criticality as the Confinement Transition of a Pseudogap-Mott Metal*

Dear Dr Abergel,

Thank you for your note regarding our manuscript, *"Mott Criticality as the Confinement Transition of a Pseudogap-Mott Metal."* I understand the high volume of submissions and the high standards at *Nature Physics*. Nevertheless, given the novelty and significance of our findings, I respectfully request that you reconsider sending our manuscript for external peer review. Below, I put forward our reasons for this request.

1. A first concrete realization of Nevil Mott's vision for a correlation-driven insulator
Our work provides a controlled theoretical framework for the Mott problem in a two-dimensional system, i.e., how strong electronic repulsion drives the breakdown of Landau quasiparticles into a pseudogap–Mott metal, and finally a continuous confinement transition into a Mott insulator. This directly realizes Mott's original vision (from 1949) of repulsion-driven insulation without the onset of any form of magnetic order. To our knowledge, no prior work has identified the pseudogap as a distinct long-range entangled metallic phase that is continuously connected to the Mott transition in this way.

2. A new organizing principle for correlated matter
We uncover a novel "Mott metal" non-Fermi liquid, governed by the interplay of:

- strong electronic correlations,
- generalized symmetry and Fermi surface topology (through Luttinger surfaces), and
- long-range and multipartite entanglement.

This constitutes a new organizing principle for strongly correlated fermionic matter, with pseudogap physics and Mott criticality being important outcomes. Importantly, the scale invariant nodal Mott metal at the Mott critical point is analytically tractable through an exactly solvable Hatsugai–Kohmoto model, offering precious insight into a very rare form of strongly interacting, long ranged entangled quantum matter. This carries considerable weight in providing a fundamental understanding of a venerable field of study.

3. Broad relevance across communities
Our results are not confined to specialists of cuprates or Hubbard models. As the fermionic Hubbard model is a very popular choice for cold-atom quantum simulators, our work has direct bearing on optical lattice experiments (see, e.g., Esslinger, *Annu. Rev. Condens. Matter Phys.* 2010; Mazurenko *et al.*, *Nature* 2017). The connection to strange-metal physics (Phillips *et al.*, *Science* 377, eabh4273 (2022)) and pseudogap phenomenology observed in

ARPES (Hashimoto *et al.*, *Nat. Phys.* 10, 483 (2014)) ensures that our predictions resonate broadly with both experimental and theoretical audiences.

4. Alignment with recent *Nature Physics* publications
Several recent articles in *Nature Physics* have highlighted exotic correlated states arising from unconventional organizing principles—for example:

- Huang, La Nave & Phillips, *Nat. Phys.* 18, 511 (2022): zeros of the Green's function and symmetry breaking in strange metals.
- Sato *et al.*, *Nat. Phys.* 13, 1074 (2017): transport anomalies in pseudogap systems.
- Very recently, studies of hidden metallic states in correlated lattices by de la Torre *et al.* (*Nat. Phys.* 21, 1267 (2025)).

Our work is directly aligned with these themes: it introduces a new metallic state—the Mott metal—grounded in a solvable construction and offering concrete experimental signatures. My co-authors and I strongly believe this is of comparable breadth and impact.

Having co-authored two publications in Nature Physics in the past, I fully understand that only work of the very highest standard and likely impact deserves your consideration. Based on the reasons given above, I believe that our work provides compelling evidence and insight constituting fundamental advance on a long-standing problem that is sure to be of broad interest. I therefore request reconsideration, and hope the manuscript can be sent to expert referees for full evaluation. I thank you again for your time and careful consideration, and would be happy to provide any clarifications or additional material that might assist the editorial process.

With sincere regards,

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(On behalf of all authors: Abhirup Mukherjee, S. R. Hassan, Anamitra Mukherjee, N. S. Vidhyadhiraja, A. Taraphder, and Siddhartha Lal)