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Lighting up dark exomoons: observational signatures of tidally induced volcanism in other worlds

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Propositions
accompanying the thesis

Lighting up dark exomoons

Observational signatures of tidally induced volcanism in other worlds

1. The synergy between exomoon transits, infrared flux detection, and tidal modelling offers a pathway to constraining the orbital eccentricity and the internal structure of tidally heated exomoons. (Chapter 2)
2. Spectroastrometry permits detections of solar system-like moons at plausible temperatures and sizes in nearby systems. (Chapter 3)
3. Photometric orbital modulation enables THEM detections at non-transiting inclinations, removing the need for the geometric alignment required by exomoon transits. (Chapter 4)
4. Transmission spectroscopy with JWST is an inefficient route to detecting cryovolcanism in the TRAPPIST-1 system. (Chapter 5)
5. Exomoon detections will move the question from “How many planets?” to “How many worlds per system?”.
6. The astronomical community should adopt the convention that the term “biosignature” is used only when multiple observables, interpreted in planetary context and supported by modeling, favor a biotic interpretation.
7. For an engineer, becoming an astronomer is a retune: the optimization flips from picking the best solution from many to extracting the most information from limited data.
8. Media should report uncertainty and process, not just breakthroughs; otherwise the public learns spectacle, not science.
9. In a society that overprioritizes outcomes, “useful” must be proven in advance, and understanding becomes a byproduct.
10. Communication across cultures fails less on words than on unspoken assumptions.
11. Moons are like bitterballen, colder outside but piping hot inside.