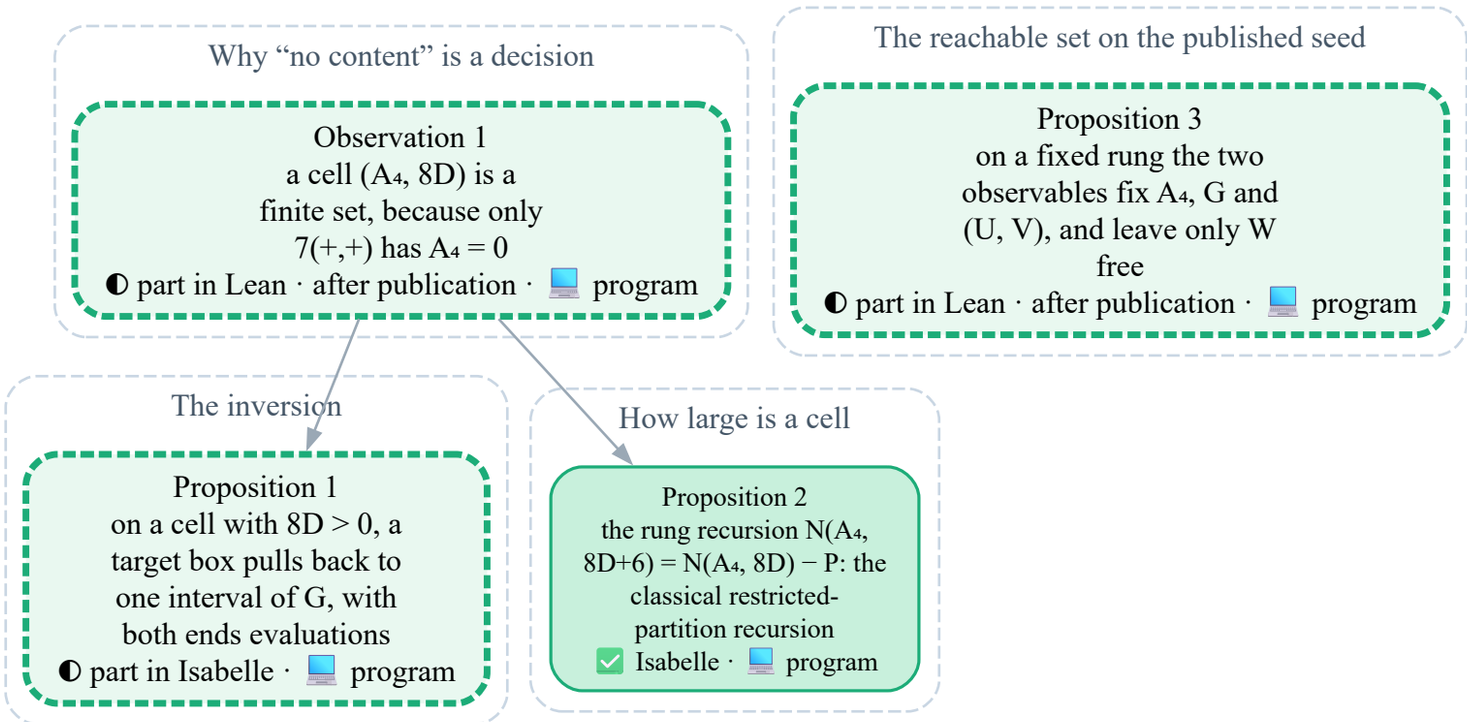
Map of *A Certified 2.68 TeV Gap in the Closed-Form Map of the Compactification Scale in SU(7) Grand Gauge-Higgs Unification, and the Invariant Its Two Observables Cannot See (Part VIII)*

High-energy physics · grand gauge-Higgs unification

4 results | ✅ **0** entirely in Lean | ◐ **3** partly in Lean | ✅ **1** in Isabelle | 💻 **4** checked by a program | written proof only

(a result can carry several tags)

Dependencies in the written proof: an arrow A → B means that this proof of B uses A. Every result rests on its written proof; the tags record what was checked besides, and each statement's "Evidence & scope" block says how far. The colour of a box is its strongest tag, in the order above; the tags in the box give the rest. Boxes with a thick border are the main results; click a box to read the statement.



What the paper contributes

Part VII of the series bounds the compactification scale of the SU(7) grand gauge-Higgs model of Komori and Maru from above. This paper runs the same closed-form map backwards: given a target $(1/R_5, m_h)$, it returns a bulk content or a named certificate that none exists. Every emptiness statement is about the closed form, not yet about the untruncated model, and the paper says so.

- **The inversion is exact** (Proposition 1): on a cell with $8D > 0$ a target box pulls back to one interval of the moment G, both ends evaluations.
- **"No content" is a decision** (Observation 1): only **7**(+,+) has $A_4 = 0$, so a cell is finite; the five certificates are cone, congruence, an exact rational Farkas pair, exhaustion and floor, and one dual certificate is printed in full.
- **A certified gap of the closed-form map**: on the published seed the enumerated image is 35 points in [8897.5, 9967] GeV ($8D = 1$) and 65 in [5258, 6215] GeV ($8D = 3$), and nothing lies in (6.216, 8.897) TeV. At the measured Higgs mass one point remains, $1/R_5 = 8967.5$ GeV, carried by 81 contents with the same one-loop potential.
- **What the two observables cannot see** (Proposition 3): on a fixed rung they fix four of the five complete invariants, but two contents share both and disagree about the vacuum invariant W.
- **Counting without building** (Proposition 2, the classical restricted-partition recursion): a cell is counted by dynamic programming, which reproduces the enumerator's totals over 69 million contents.

🚀 **Start here:** **Proposition 1**: on a cell with $8D > 0$, a target box pulls back to one interval of G, with both ends evaluations.

Main results:

- **Proposition 1**: on a cell with $8D > 0$, a target box pulls back to one interval of G, with both ends evaluations
- **Observation 1**: a cell (A_4, 8D) is a finite set, because only 7(+,+) has $A_4 = 0$
- **Proposition 3**: on a fixed rung the two observables fix A_4, G and (U, V), and leave only W free

🧭 Fields: where the paper lives and what it connects

Tools taken from other branches

- **Integer and linear programming** → exact rational Farkas certificates over the relaxation of a cell; the moment cone and the mod-6 congruence (Schrijver) — Proposition 1
- **Vector partition functions** → counting a cell without building it, by dynamic programming; the classical restricted-partition recursion (Sturmfels; Beck–Robins) — Proposition 2
- **Elementary number theory** → unique factorisation: 2^a 3^b = 1 forces a = b = 0 — Proposition 3

What the results serve

- **Phenomenology of gauge-Higgs unification** ← the certified gap (6.216, 8.897) TeV of the closed-form map, a single $1/R_5 = 8967.5$ GeV at the measured Higgs mass, and its image in the CMS dijet angular $\Delta\chi^2$ — Proposition 1
- **Inverse problems from observables to model space** ← a decidable inverse map with certificates, and an invariant (W) the two fitted observables cannot see — Proposition 3