Propositions accompanying this thesis

A Peak into the Power of the Universe

1. High-valued weak lensing peaks are a nearly pure and complete tracer of the most massive haloes, and should be regarded as the weak lensing analogue of cluster abundance studies. *(Chapter 3)*
2. The use of weak lensing peaks is usually motivated as probes of non-linear structures. The fact that their redshift distribution constrains cosmology better than their abundance, at no additional observational cost, shows this framing undersells what weak lensing peaks actually offer. *(Chapter 4)*
3. The improved internal consistency of KiDS-Legacy relative to KiDS-1000 suggests that a meaningful fraction of the S_8 tension reported in earlier analyses was systematics rather than new physics. *(Chapters 5 & 6)*
4. The detection of a 30 per cent suppression of the matter power spectrum at $k = 3$–$20\,h$ Mpc^{-1} directly from cosmic shear, without assuming any baryonic feedback model, shows that weak lensing can measure feedback rather than merely constrain a parameter that stands in for it. *(Chapter 6)*
5. Of the two dominant astrophysical systematics in weak lensing, only one – baryonic feedback – has a plausible path to being constrained by external data. No comparable external calibration exists, or is likely to exist soon, for intrinsic alignments.
6. Reporting a preference for a physical model without first establishing which scales a statistic is sensitive to risks mistaking a prior, or an artefact of scale insensitivity, for a detection.
7. The convention of reducing astrophysical effects to nuisance parameters in cosmological inference reflects a hierarchy of interest, not a hierarchy of importance.
8. The precision promised by stage-IV surveys such as *Euclid* is observational. Without corresponding progress in theoretical and numerical modelling, this precision will not translate into accurate cosmological parameters.
9. A bias of less than 1σ is not unbiased.
10. Large, long-lasting collaborations should not use indefinite, unconditional signing rights to all collaboration papers as a reward system.
11. The rise of AI-optimised, low-precision computing hardware will increasingly require computational cosmologists to adapt their algorithms or risk becoming constrained by the hardware on which they rely.
12. Whether in spacecraft, scientific theories, or ourselves, imperfections often illuminate the path to progress, as Leonard Cohen put it: *"There is a crack, a crack in everything. That's how the light gets in."*

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