Constructing a Maximum Tension Coordinate with Neural Networks

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An article usually includes an abstract, a concise summary of the work covered at length in the main body of the article.

I. INTRODUCTION

With cosmological measurements becoming more precise over recent years, discrepancies between different datasets and methods have began to emerge. Cosmological observations of parameters surrounding the ΛCDM model have yielded discrepancies, or more commonly referred to as *tensions*, of up to 5σ – the indication of a significant result in particle physics [1].

The debate over the Hubble constant's value is one that is hardly new, and in recent years has risen to prominence in cosmology, earning itself an apt label of a cosmological *crisis*. Disagreement over the Hubble constant began between de Vaucouleurs and Sandage in the 1980s [2, 3], and it has now developed into an area of contention between early- and late-universe cosmologists. As it stands, measurements between these two factions are at a significant tension of 5σ, as shown in Figure **??**.

[1] A. Franklin, *Shifting Standards: Experiments in Particle Physics in the Twentieth Century* (University of Pittsburgh Press, Pittsburgh, 2013) Chap. Prologue, p. XXXVII, https://doi.org/10.2307/j.ctv80c9p7.

[2] G. de Vaucouleurs, New results on the distance scale and the Hubble constant, in *Galaxy Distances and Deviations from Universal Expansion*, edited by B. F. Madore and R. B. Tully (Reidel, Dordrecht, 1986) pp. 1–6, https://doi.org/10.1007/978-94-009-4702-3_1.

[3] A. Sandage and G. A. Tammann, Steps toward the Hubble constant. V. The Hubble constant from nearby galaxies and the regularity of the local velocity field., Astrophys. J. **196**, 313 (1975), https://doi.org/10.1086/153413.

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