

Title: Newton's Method in Cosmology Today

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Abstract: Newton's inferences from phenomena realize an ideal of empirical success that's richer than prediction. To realize Newton's richer conception of empirical success a theory needs to do more than to accurately predict the phenomena it purports to explain: in addition it needs to have the phenomena accurately measure parameters of the theory. Newton's method aims to turn theoretical questions into ones which can be empirically answered by measurements from phenomena.

Propositions inferred from phenomena are provisionally accepted as guides to further research.

Newton's ideal of empirical success as agreeing measurements from diverse phenomena is appealed to in support of the radical inference to dark energy in cosmology today. Robert Kirshner (two of his PhDs share one half of 2011's Nobel Prize in physics) gave an account of the role of cosmic microwave background measurements, to back up the supernova measurements and measurements from galaxy clustering in supporting the transition of dark energy from a wild hypothesis into an accepted background assumption that guides further research in cosmology today. This illustrates a feature of agreeing measurements from diverse phenomena that is especially important for turning data into evidence. To the extent that the sources of systematic error of the different measurements can be regarded as independent, their agreement contributes additional support for counting them as accurate rather than as mere artifacts of systematic error.

Outline

1. Acceptance of Dark Energy Today
2. Newton's Methodology: Acceptance empirically guided by theory mediated measurements
3. Example: Mercury's perihelion before and after Einstein
4. Determining Cosmological Parameters and Supporting Dark Energy