

Wang

PROBLEM 2

Dark energy was discovered using the observations of Type Ia supernovae (SNe Ia).

- (1) The measurement of X (using SN Ia observations) led to the discovery of the existence of dark energy. What is X ? (2 pts)
- (2) Express X in terms of the cosmological parameters that describe our Universe. Explain in as much detail as you can. (2 pts)
- (3) If the peak brightness of a very large sample of SNe Ia has an observational uncertainty of 0.05 mag, and an intrinsic uncertainty of 0.12 mag, what is the resultant uncertainty in X ? (3 pts)
- (4) What are the systematic uncertainties of SNe Ia as a dark energy probe? How can these be mitigated? Explain in as much detail as you can. (3 pts)

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Astro #2

a) The Hubble parameter H_0