

Problem 19.10. Suppose astronomers are able to find a family of objects whose absolute luminosities L are known. Suppose their apparent luminosities ℓ (or equivalently their luminosity distance d_L) and their redshift z are measured. Using the Robertson-Walker line element, find an expression for ℓ (or d_L) as a function of L , z , H_0 and q_0 for small z .