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Analysis of Type Ia supernovae light curves in observed bands

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Type Ia supernovae play an important role of standard candles in modern cosmology. They also exhibit a phenomenon of light curve broadening which increases with distance. It is widely accepted that the broadening is proportional to (1+z) factor and strongly supports accelerated expansion of Universe. However, the analysis of the conducted research on the Type Ia supernovae reveals some deficiencies and logical loops in it. To eliminate such problems, it is suggested to analyze observational data by building light curves in observed bands without fitting to templates. Using observational data of 3-years Supernova Legacy Survey (SNLS), the empirical light curves were built for each supernova in griz bands (whenever it was possible) in natural (non-logarithmic) scale, for red shifts greater than 0.6. The theoretical predictions of light curves in observed griz bands for different red shifts were obtained using computer simulation of light propagation from exploding supernova to an observer. The simulation model uses the assumptions of the standard model on (1+z) time dilation. The input data for computer simulation are spectra templates of typical Type Ia supernova explosion. The simulation model also considers light extinction in our galaxy and filter transmission characteristics of the telescopes used in SNLS. The comparison of simulated light curves with light curves built using SNLS observational data reveals violations of (1+z) time dilation hypothesis. Some of the results point to the existence of dust in the intergalactic space. Recommendations for future observations of supernovae were submitted to NASA and published on NASA web-site.

Biography

Herman Holushko received MS degree in Computer Science at The Bauman Moscow State Technical University in 1990. He has professional experience in computer simulation and currently works as a Software Engineer in Canada. His articles on computer simulations were published in professional journals and conference proceedings. As an independent researcher he applies his experience for research in astrophysics.

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