

Chromaticity of Gravitational Microlensing Events

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In this paper, we investigate the color changes of gravitational microlensing events caused by the two different mechanisms of differential amplification for a limb-darkened extended source and blending. From this investigation, we find that the color changes of limb-darkened extended source events (color curves) have dramatically different characteristics depending on whether the lens transits the source star or not. We show that for a source-transit event, the lens proper motion can be determined by simply measuring the turning time of the color curve instead of fitting the overall color or light curves. We also find that even for a very small fraction of blended light, the color changes induced by blending is equivalent to those induced by limb darkening, causing serious distortion in the observed color curve. Therefore, to obtain useful information about the lens and source star from the color curve of an event, it will be essential to correct for blending. We discuss various methods to correct for blending.