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Characterizing long-term leptonic variability in blazars

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Most research on blazar variability focuses on individual flares to explain acceleration and radiation mechanisms and improve on current models. These short-time events (being minutes, hours, or days) might not be representative of the underlying mechanisms causing small-amplitude variability and/or continuous emission which is present most of the time. We will therefore investigate long-term (months to years) variability of blazar emission in the framework of current leptonic blazar models. For this purpose, we introduce generated time-dependent parameter variations which are based on typical Power Spectral Densities (PSDs) associated with the variability of accretion flows. The PSDs from the resulting light curves are analyzed and compared to one another, as well as the PSD of the input variation. Correlations between light curves are also investigated to aid identification of characteristic variation patterns associated with leptonic models. The resulting multi-wavelength PSDs were found to follow the input variation PSD trend closely, however, it presented no clear distinctions between the varied parameters. The multi-wavelength cross-correlations showed significant difference among the varied parameters. We therefore conclude that the PSDs are plausible candidates for extracting the variational trends of variability progenitors while multi-wavelength cross-correlations would be a plausible diagnostic for identifying radiative mechanism characteristics as well as the varying quantity in the emission region.

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