Microvariability in the southern γ-ray blazar PKS 0537-441

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The southern blazar PKS 0537-441 is one of the most variable active galactic nuclei. It has displayed extreme forms of variability in its emission from radio to gamma-ray wavelengths. Intraday variations in the radio, optical, and gamma-ray flux have been reported with similar timescales. This has led Romero et al. (1995) to postulate a superluminal microlensing model based on previous reports of an interposed galaxy. Here we present results of new optical microvariability observations in the V and R bands, obtained with high-quality CCD photometry made with a 2.15-m telescope at CASLEO, Argentina. We have found variability with amplitudes of more than 100 % over timescales of $\sim$ 2 days, similar to what has been observed in gamma-rays by EGRET in 1996. The spectral index, contrarily to what is expected from microlensing, showed changes of more than 16 % during the observing period, with a trend to steepen with decreasing flux. This seems to reflect an intrinsic mechanism and, consequently, suggests that optical and gamma-ray emitting regions can be co-extensive. If the most extreme manifestations of radio variability are also intrinsic, they might involve coherent emission processes. We have used our observations, along with the EGRET data, to constrained the central black hole mass, which seems to be $\sim 7 \times 10^7\ M_\odot$. For such a mass, the variability is originated at $\sim$ 320 gravitational radii.