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research highlights

ACTIVE GALAXIES

Flickering lights on the sky

Mon. Not. R. Astron. Soc. (in the press);
preprint at https://arxiv.org/abs/1706.03079

Gravitational microlensing can, in part, explain changes in the brightness of active galactic nuclei (AGNs) over timescales of years. AGNs are powered by supermassive black holes accreting matter through an accretion disk, often appearing variable on temporal scales ranging from hours to days, months and years or longer. Matthew J. Graham and collaborators used an optical survey to understand the causes behind this variability.

The Catalina Real-time Transient Survey (CRTS) utilizes telescopes in the US and Australia to observe ~2,500 deg^2 of the sky over 21 nights per lunation and with a cadence of down to 10 minutes for each patch of the sky. Graham *et al.* extracted light curves for roughly 900,000 quasars (luminous AGNs) from the CRTS and identified major flaring activity that rises above the 'quiescent' level of stochastic variability typically associated with AGNs. 51 such flaring quasars were identified, with energies released during these episodes of up to 10^{53} erg.

Graham *et al.* analysed the duration and rise and fall times of individual flares to reveal the physical mechanism behind them. Gravitational microlensing — a massive foreground object operating as a lens that magnifies a single background object (here a quasar) — has been discussed in this context. The authors find that only a subset (<20%) of their flaring objects can be explained by this mechanism. The rest, they conclude, must be a result of explosive stellar phenomena in the quasar accretion disks — superluminal supernovae explosions, tidal disruption of stars or even stellar merger events.

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