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Unusual optical dimming and near-infrared brightening in ASASSN-21qj: exocometary breakup or colliding ice-giants?

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Surveys designed to find exoplanetary transits, such as the one done by Kepler, have turned up the existence of stars showing unusually long and deep dimming events.
The first main sequence star reported to show this behavior was KIC 8462852 (Boyajian et al. 2015), and the leading hypothesis is that the dimming is caused by dust from disintegrating comets (e.g., Thompson et al. 2016). To date, the number of objects showing this behavior has grown to about a few dozen, including detections in transient
surveys not specifically designed to find exoplanets.
The most extreme dimming is reported for an object discovered by the All-Sky automated Survey for Supernovae in December 2021. The stellar flux of this object, ASASSN-21qj, was almost completely extinguished during the two deepest dips in the light curve. We have performed ground-based follow-up observations in order to extend the ASASSN lightcurve, using the time between the two deepest dips as an indication of an orbital period (Marshall et al. 2023). We complemented this with a lightcurve from NEOWISE, showing a near-infrared brightening in advance of the dimming event. We have used these observations to constrain the mass and temperature of dust in the circumstellar environment and conclude that the source of this dust could be the catastrophic breakup of one or more exocomets. Recently, an alternative explanation was provided by Kenworthy et al. (2023), who suggest a collision between two ice giants further out in the planetary system as the source of the dust. We will compare the two scenarios.

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