How common is LBV S Dor variability at low metallicity?

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It remains unclear whether massive star evolution is facilitated by mass loss through stellar winds only, or whether episodic mass loss during an eruptive luminous blue variable (LBV) phase is also significant. LBVs exhibit unique photometric and spectroscopic variability (termed S Dor variables). This may have tremendous implications for our understanding of the first stars, gravitational wave events, and supernovae. A key question here is whether all evolved massive stars passing through the blue supergiant phase are dormant S Dor variables transforming during a brief period, or whether LBVs are truly unique objects.
By investigating the OGLE light-curves of 64 B supergiants (Bsgs) in the Small Magellanic Cloud (SMC) on a timescale of three years with a cadence of one night, the incidence of S Dor variables amongst the Bsgs population is investigated. From our sample, we find just one Bsg, AzV 261, that displays the photometric behaviour characteristic of S Doradus variables. We obtain and study a new VLT X-shooter spectrum of AzV 261 in order to investigate whether the object has changed its effective temperature over the last decade. We do not find any effective temperature variations indicating that the object is unlikely to be a LBV S Dor variable. As there is only one previous bona-fide S Dor variable known to be present in the SMC (R 40), we find the maximum duration of the LBV phase in the SMC to be at most ~ few 1000 yrs, or more likely that canonical Bsgs and S Dor LBVs are intrinsically different objects. We discuss the implications for massive star evolution in low metallicity environments, characteristic of the early Universe.

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