How unique is Plaskett's star? A search for organized magnetic fields in short period, interacting or post-interaction massive binary systems

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Amongst O-type stars with detected magnetic fields, the fast rotator in the close binary called Plaskett's star shows a variety of unusual properties. Since strong binary interactions are believed to have occurred in this system, one may wonder about their potential role in generating magnetic fields. Stokes V spectra collected with the low-resolution FORS2 and high-resolution ESPaDOnS and Narval spectropolarimeters were therefore used to search for magnetic fields in 15 interacting or post-interaction massive binaries. No magnetic field was detected in any of them, with 0G always being within 2sigma of the derived values. For 17 out of 25 stars in the systems observed at high-resolution, the 90% upper limit on the individual dipolar fields is below the dipolar field strength of Plaskett's secondary; a similar result is found for five out of six systems observed at low resolution. If our sample is considered to form a group of stars sharing similar magnetic properties, a global statistical analysis results in a stringent upper limit of ~200G on the dipolar field strength. Moreover, the magnetic incidence rate in the full sample of interacting or post-interaction systems (our targets + Plaskett's star) is compatible with that measured from large surveys, showing that they are not significantly different from the general O-star population. These results suggest that binary interactions play no systematic role in the magnetism of such massive systems.

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