# Are the rotation period distributions in zero-age main sequence open clusters alike?

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## Observations

- 42 d-long time series photometry from Yale 1 m telescope at CTIO
- Surveyed ~1 sq. degree centred on NGC 2516
- PSF photometry yields 14 000 light curves

## NGC 2516

- Well-studied cluster without prior rotation periods for G and K dwarfs
- 150 Myr-old, *d* = 409 pc, solar-like metallicity

## Stellar rotation in NGC 2516

- 844 members in the surveyed area based on Gaia DR2 data, photometry and spectroscopy from the literature
- 308 rotation periods among them
- 367 additional rotation periods from Irwin et al. (2007) and Healy & McCollough (2020)

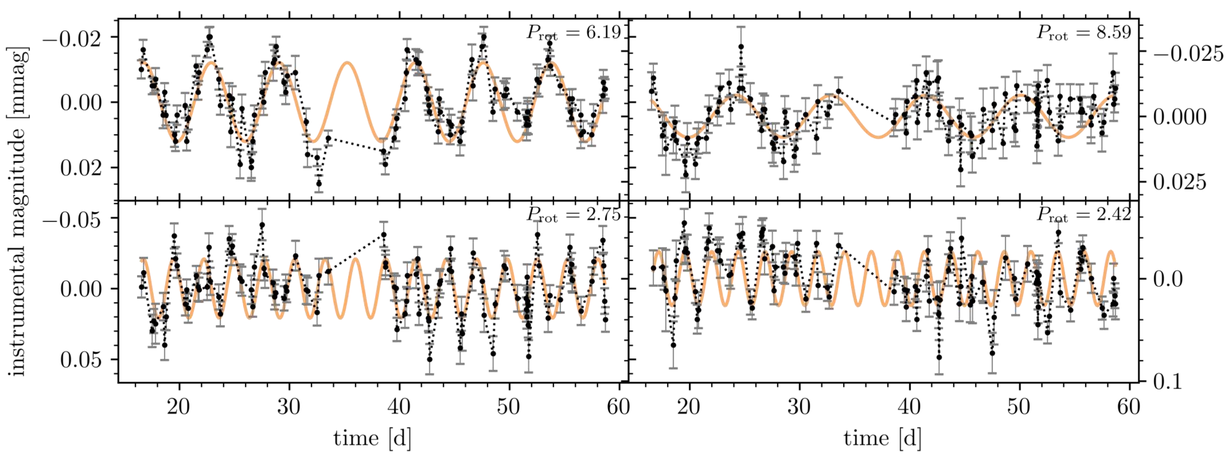


*Fig. 1:* Examples of light curves for stars of different rotation periods from our photometry.

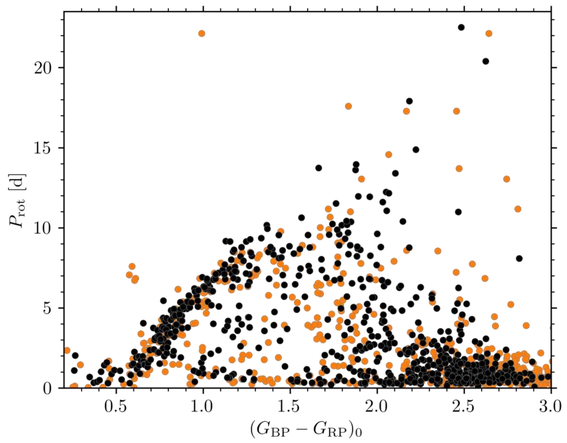


*Fig. 2:* Comparison between the colour period diagrams of NGC 2516 (black) and the Pleiades (orange). Their rotation period distributions are essentially identical. Both open clusters also host slowly rotating M dwarfs in the *extended slow rotator sequence* (*P* > 12 d), a feature unseen in other open clusters to-date.

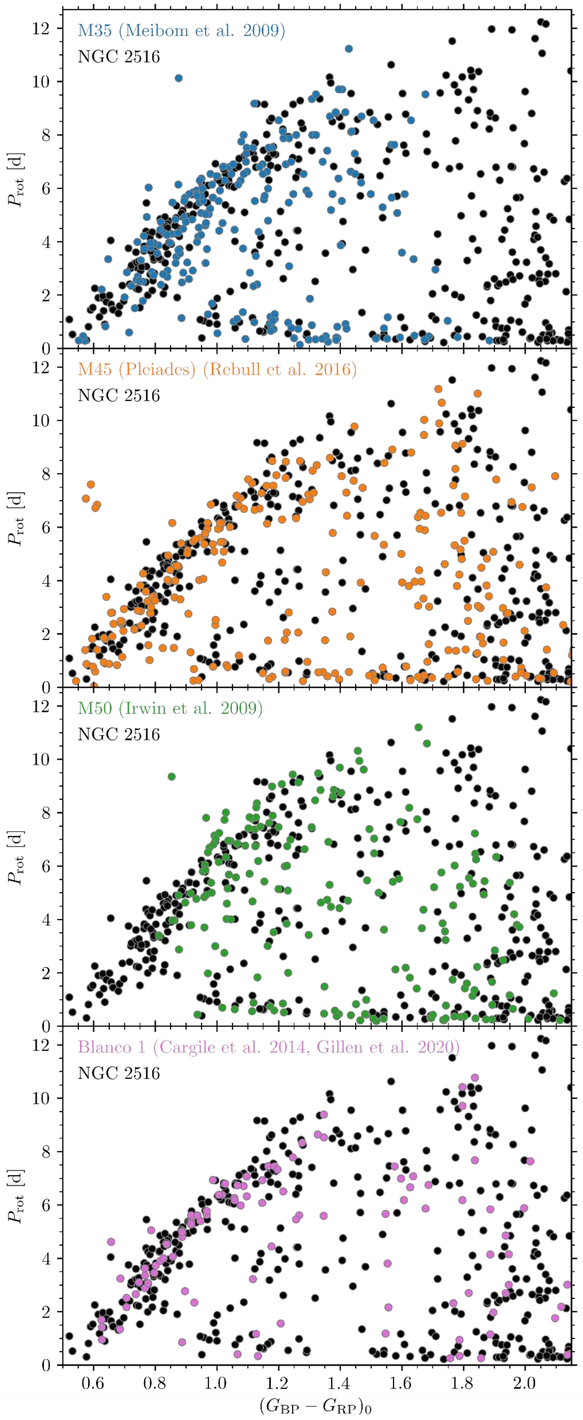


*Fig. 3 (right):* Comparison of the rotation period distributions of NGC 2516 (black, each panel) with the four coeval open clusters M 35, Pleiades, M 50, and Blanco 1. Within the limitations of the individual studies, these clusters host identical rotation period distributions. The identical distributions show that the cluster environment has no significant influence on the angular momentum evolution of young zero-age main sequence stars. Hence, rotational stellar evolution appears to be universal.

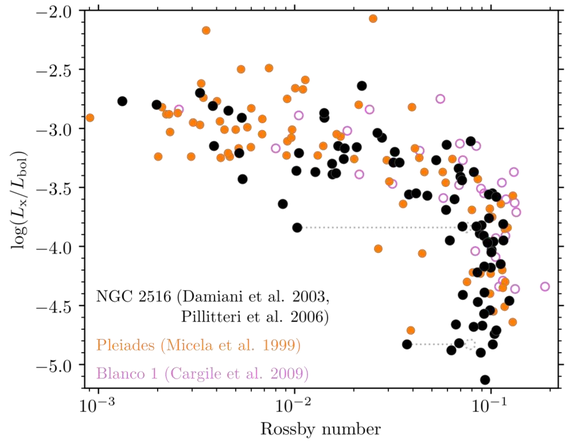


*Fig. 4:* X-ray luminosity against the Rossby number for stars in NGC 2516, Pleiades, and Blanco 1. In this rotationally selected sample NGC 2516 is not under-luminous compared with the other open clusters, as previously found (Micela et al. 2000).

## Conclusions

- We have measured rotation periods for 307 members of NGC 2516, and combined them with 367 rotation periods from the literature.
- Angular momentum evolution of young stars is identical to a level such that we cannot find cluster-to-cluster variations in the rotation period distribution.
- NGC 2516 and the Pleiades both host the previously unseen *extended slow rotators sequence*.
- Stars in NGC 2516 show the same X-ray activity as in other open clusters (in a rotationally selected sample).

## References

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Questions? Comments? Ideas? Let us know: dfritzewski@aip.de