

Stars and planets through time

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While we have detected over 4000 planets around old main-sequence stars like our Sun, we have only discovered a handful of planetary systems around young stars with ages less than a few hundred million years. These young planetary systems are very important, however, as they directly link our theories of planet formation and early evolution to the older exoplanet population. In doing so, they offer important new insights into some of the key outstanding questions in exoplanet research. Two such questions are: (i) how do planetary systems form and evolve into the diverse population that we observe? And (ii) how does early stellar activity affect subsequent planet habitability? To help answer these questions, we can detect new young planetary systems and characterise the variability of young stars.

Young open clusters and dispersed stellar associations are groups of tens-to-thousands of stars that formed together and hence share a common age. This makes them powerful astrophysical laboratories to probe the early evolution of both stars and the planetary systems they host. The Transiting Exoplanet Survey Satellite (TESS) and the Next-Generation Transit Survey (NGTS) are two leading exoplanet transit surveys that are monitoring dispersed stellar associations and dense open clusters. The group at QMUL leads the NGTS clusters survey and a dedicated TESS programme designed to detect new young transiting planets and characterise the effect of early stellar activity on subsequent planet habitability. This PhD project will involve working with NGTS and/or TESS data to detect new young planetary systems and characterise the early evolution of stellar activity (see Figure).

There is broad scope for tuning the specific project to the interests of the student, so interested applicants are encouraged to contact Dr Edward Gillen (e.gillen@qmul.ac.uk) if they have any questions or would like to discuss any aspect of the project.

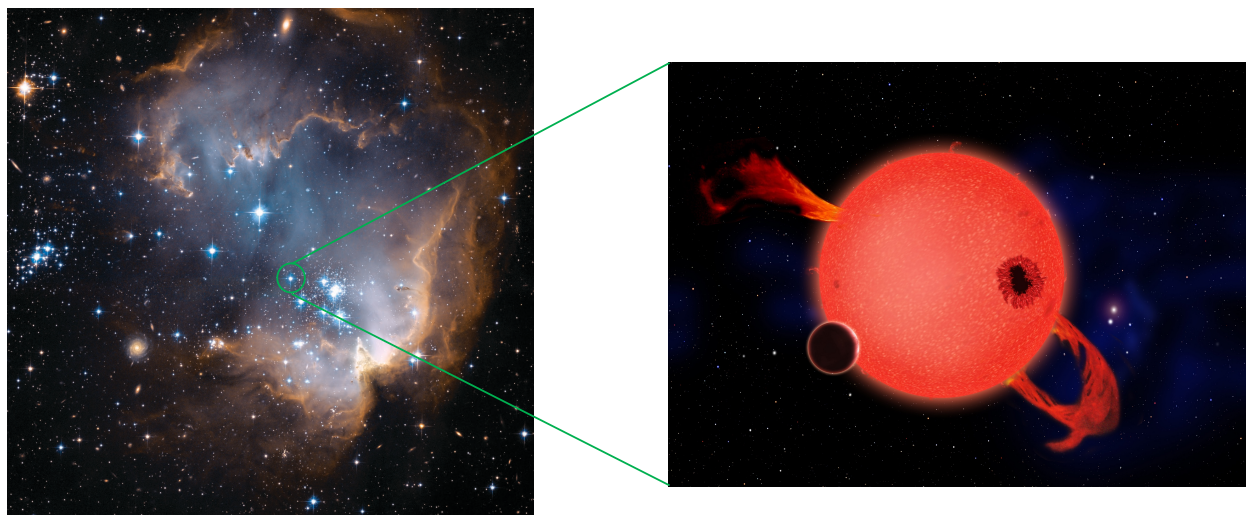


Figure: (Left) A group of young stars in a star forming region, as observed by the Hubble Space Telescope. (Right) An artistic impression of what we might see if we zoomed in around one of these young stars: the star hosts an orbiting planet, which is just starting to transit across the star, and also displays magnetic activity in the form of spots and flares, which may influence the potential habitability of the planet.

Note: This project description can be used for the “Research Proposal” part of your application.